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1986-87



PAKISTAN SCIENCE FOUNDATION



Pakistan Science Foundation

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1986 - 87

PAKISTAN SCIENCE FOUNDATION
Almarkaz F7/2
Islamabad

LETTER OF TRANSMITTAL

Islamabad

Dear Mr. Secretary

I have the honour to enclose herewith the Annual Report of the Pakistan Science foundation for the Fiscal year 1986-87, alongwith its audited accounts, as adopted by the Board of Trustees for submission to the National Assembly as required by the Pakistan Science Foundation Act III of 1973.

With regards.

Yours sincerely,

Sd/-

(Dr. M. D. Shami)

Chairman

PAKISTAN SCIENCE FOUNDATION

**Secretary,
Ministry of Science and Technology,
Government of Pakistan,
ISLAMABAD.**

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LIST OF ABBREVIATIONS

Province

B	Baluchistan
C	Centre
F	Frontier
P	Punjab
S	Sind

Sponsoring Institutions

AC	Agricultural College
AU	Agricultural University
EU	Engineering University
QU	Quaid-i-Azam University
KU	Karachi University
GC	Government College,. Haripur
PU	Peshawar University/Punjab University
SU	Sind University
KMC	Khyber Medical College
NHL	National Health Laboratories
CSIR	Council of Scientific & Industrial Research
JPMC	Jinnah Post-graduate Medical Centre
NIAB	Nuclear Institute for Agriculture & Biology

Disciplines

AGR	Agricultural Science
BIO	Biological Sciences

ENG	Engineering Sciences
MED	Medical Sciences
PHY	Physical Sciences
CHEM	Chemical Sciences
MATH	Mathematics & Computer Sciences
EARTH	Earth Sciences
OCEAN	Oceanography
ENVR	Environmental Sciences

INTRODUCTION

The Pakistan Science Foundation was established on June 30th, 1973 under the Pakistan Science Foundation Act No.III of 1973 (Annexure-I) as an autonomous body to promote and finance scientific and technological activities having a bearing on the socio-economic needs of the country. Under the Act, the Foundation has been entrusted to carry out the following functions:-

- a)
 - i) establishment of comprehensive scientific and technological information and dissemination centres;
 - ii) promotion of basic and fundamental research in universities and other institutions on scientific problems relevant to the socio-economic development of the country;
 - iii) utilization of the results of scientific and technological research including pilot plant studies to prove the technical and economic feasibility of processes found to be promising on a laboratory scale;
 - iv) establishment of science centres, clubs, museums, herbaria and planetaria;
 - v) promotion of scientific societies, associations and academies engaged in spreading the cause of scientific knowledge in general or in the pursuit of a specific scientific discipline or technology in particular;
 - vi) organization of periodical science conferences, symposia and seminars;
 - vii) exchange of visits of scientists and technologists with other countries;
 - viii) grant of awards, prizes and fellowships to individuals engaged in developing processes products and inventions of consequence to the economy of the country; and
 - ix) special scientific surveys not undertaken by any other organization and collection of scientific statistics related to the scientific efforts of the country.

- b) The Foundation shall also:-
- i) review the progress of scientific research sponsored by it and evaluate the results of such research;
 - ii) maintain a National Register of highly qualified and talented scientists/engineers and doctors both in and outside Pakistan, and to assist them in collaboration with concerned agencies to seek appropriate employment; and
 - iii) establish liaison with similar bodies in other countries.

The activities performed under the above mentioned statutory functions are given in the chapters that follow.

CHAPTER- I

ACTIVITIES AND PROGRAMMES

The progress of work during the year 1986-87 is summarised below:-

FUNCTION I

ESTABLISHMENT OF SCIENTIFIC AND TECHNOLOGICAL INFORMATION CENTRE (PASTIC)

PASTIC has a national centre at Islamabad and four provincial sub-centres at Karachi, Lahore, Peshawar and Quetta. It has provided the following services to the users, which include Scientists, Engineers and Technologists etc. in the country:-

i) *DOCUMENT PROCUREMENT & SUPPLY SERVICES:*

Four thousand eight hundred and eighty four (4884) Scientific/technical documents were procured from the National/International sources and supplied to individual researchers and S&T Organizations during the period under report. The number of requests received during the year was 6372.

ii) *PUBLICATIONS:*

a) *PAKISTAN SCIENCE ABSTRACTS:-*

Published quarterly, it contains the abstracts of published papers on scientific/technological research work done in Pakistan. The following issues were published:-

1985 Vol - 25, Nos: 2,3,4.

1986 Vol - 26, Nos; 2,3,4.

1987 Vol - 27, Nos: 1,2.

b) *OTHER PUBLICATIONS:-*

- A Bibliography on Natural History of Pakistan.
- Directory of Agricultural Libraries of Pakistan.
- List of Scientific Serial Holdings of the following Institutions' Libraries:-

i) University Grants Commission, Islamabad.

- ii) Pakistan Council for Research in Water Resources, Islamabad.
- iii) National Science Reference Library
PASTIC National Centre, Islamabad.
- iv) National Institute of Electronics, Islamabad.
- v) National Institute of Silicon Technology, Islamabad.
- vi) National Physical & Standard Laboratories, Islamabad.
- vii) Defence Science & Technology Organization, Rawalpindi.
- viii) Heavy Foundry & Forge, Taxila.
- ix) Pakistan Council of Scientific & Industrial Research, Lahore.
- x) Department of Botany, University of the Punjab, Lahore.
- xi) Pakistan Standard Institute, Karachi.
- xii) Jinnah Postgraduate Medical Centre, Karachi.

iii) ***NATIONAL SCIENCE REFERENCE LIBRARY***

Eleven hundred and ninety two issues of 631 journals/periodicals and 430 titles comprising books/documents were received by the Library. The Library material was duly classified and catalogued. Records regarding 317 journal titles and 100 books were computerized. PASTIC Sub-Centre at Karachi received a total of 267 copies of journals/Reports/Documents.

iv) ***PROGRAMMING AND DATA PROCESSING***

a) **DATA ENTRY**

- i) Patent Information: Bibliographic data of 22789 patents available on microform was entered in computer bringing the number of machine readable record of Patents to 29989.
- ii) Scientific Research Literature Published in Pakistan: This comprised of 979 records for Pakistan Science Abstracts Vol-25, Nos.2,3,4,; Vol-26, Nos=2,3,4,; Vol.27, Nos.1,2.

- iii) Lists of Scientific Serial Holdings: 6912 records comprising 1428 journal/periodical titles of 12 Libraries of various R&D institutions in the country were entered.
- iv) Mailing list for Technology Information: 2324 records were entered.
- v) 399 records of subject bibliographies were also computerized.
- b) DATA OUTPUT
 - i) Camera ready copies for the eight issues of Pakistan Science Abstracts, Vol. 25,26 and 27 were produced. Word processing for 979 abstracts was performed.
 - ii) Camera ready copies of the lists of Scientific Serial Holdings, comprising 6912 records of 1428 journal titles of seven libraries were produced for printing.
- v) BIBLIOGRAPHIES

Seventeen subject bibliographies containing 399 references were prepared.
- vi) UNION CATALOGUE

Scientific Serial holdings of 12 libraries were prepared and institution wise lists published. The names of institutions are listed under the heading 'publications'.
- vii) REPROGRAPHY

The Reprography unit completed 135 printing jobs for 12 organisations including PASTIC. 84984 pages photocopied, 4009 pages cyclostyled and 17,55,419 printing impressions were produced.

FUNCTION-II: Research Support

Promotion of basic and fundamental research in universities and other institutions on scientific problems relevant to the socio-economic development of the country.

The Foundation supported scientific research through the following programmes:-

- (a) Grants for scientific research projects submitted by individuals or groups of scientists in the universities and research institutions is the Foundation's principal programme for the promotion of basic and fundamental research.
- (b) Institutional Support i.e. provision of equipment, literature, staff training facilities, etc. to build institutional capabilities for conducting research.
- (c) Support for participation in regional and international research programmes.

A. GRANTS FOR RESEARCH PROJECTS SUBMITTED BY INDIVIDUAL RESEARCH WORKERS OR GROUPS OF SCIENTIFIC WORKERS.

During the period under report, 28 project proposals costing Rs.15.42 million were received by the Foundation, whereas 71 project proposals, which had been at the various stages of their processing, were carried over from the previous year. Thus 99 project proposals remained under active consideration of the Foundation during the period 1986-87. These proposals were examined by subject experts according to the criteria laid down by the Foundation which are:-

- i) Competence of the scientific personnel available to carry out the proposed research;
- ii) Institutional capability i.e., availability of requisite equipment, library facilities and support from scientific colleagues;
- iii) Scientific merit of the proposed research and
- iv) Likelihood of completion of project within the stipulated time and achievement of results.

Project proposals, after initial review, are placed before the relevant Technical Committees. The projects recommended by the Technical Committees are then placed before the Executive Committee of the Foundation for final sanction. During the report period only 24 projects (Annexure-II) could be sanctioned at an estimated cost of Rs.6.664 million. The subject wise details of these projects is given in Table -1.

Brief summaries of the projects sanctioned in 1986-87 are as under:-

**LIST OF SCIENTIFIC RESEARCH PROJECTS SANCTIONED
DURING JULY, 1976 TO JUNE, 1987**

DISCIPLINE	1973-83		1983-84		1984-85		1985-86		1986-87	
	No.of schemes	Amount sanct- ioned	No.of schemes	Amount sanct- ioned	No.of schemes	Amount sanct- ioned	No.of schemes	Amount sanct- ioned	No.of schemes	Amount sanct- ioned
Agricultural Sciences	26	4.741	2	0.645	3	0.655	-	-	2	0.492
Biological Sciences	59	7.951	3	0.580	4	1.254	4	0.869	5	1.457
Chemical Sciences	78	9.591	3	0.618	3	0.314	5	1.363	10	3.341
Earth Sciences	13	1.398	-	-	3	0.670	-	-	4	1.411
Engineering Sciences	7	1.08	-	-	1	0.167	-	-	1	0.377
Environmental Sciences	14	1.554	2	0.383	-	-	1	0.547	-	-
Mathematical Sciences	5	0.250	-	-	-	-	-	-	-	-
Medical Sciences	39	4.077	3	0.824	7	1.857	4	1.444	2	0.129
Oceanography	3	0.456	1	0.820	-	-	-	-	-	-
Physical Sciences	20	3.654	-	-	3	0.970	2	0.986	-	-
Total:-	264	34.751	14	3.871	24	5.887	16	5.209	24	7.207

AGRICULTURAL SCIENCES

S-PCCC/AGR (77/1)

Title: Development of Commercial Cotton Hybrid -(Extension Project)

The proposal is an extension of the project conducted under same title, wherein fifty hybrids of *G. hirsutum* and *G. Barbadosense* combinations were evaluated against a local variety of cotton viz Qalandri. Out of fifty (50) hybrids, thirty one (31) have given better performance. The investigations concluded that further comparison and selection of best hybrids among themselves would lead to the isolation of the most suitable combination for production of commercial cotton hybrid.

The extension project is aimed at exploiting the hybrid vigour in *G. hirsutum* and *G. barbadense* hybrids to achieve a break-through in cotton yield both quantity and quality wise so as to have enough surplus for export purposes.

The results of studies would help to boost up cotton production in our country, and to improve the quality of cotton in order to compete in the international cotton trade.

P-UET/AGR (89)

Title: Studies on Adopted Reclamation Practices in Pindi Bhattian.

The problem of waterlogging and salinity poses a serious threat to the economy of Pakistan. According to the statistical data collected by the Directorate of Soil Survey of Pakistan an area of 13.5 million acre is affected by soil salinity in the country. Pakistan is an agricultural country where 80% of its population earns livelihood directly or indirectly from agriculture. Thus prosperity of these people depends on how best the problem of salinity and sodicity is tackled.

The project envisages (i) the evaluation of soil reclamation practices in Punjab (ii) physiological improvements of the developed culturable waste land for crop production (iii) cost benefit ratio of various practices, (iv) detailed water quality survey of 50 tubewells installed by PLUA and its effect on soil chemical properties and (v) fertilizer application alongwith its effect on crop yield.

The results of these investigations would help improving the reclamation and development practices adopted for the culturable waste land of Pindi Bhattian area.

BIOLOGICAL SCIENCES:

S-KU/Bio (116/1)

Title: Chemotaxonomic Studies in Angiosperms (from Pakistan) with reference to Phenolics.

This proposal is an extension of the project conducted under the same title under which a preliminary survey and identification of phenolic constituents in the members of leguminosae family (i.e. sub-families Mimosoideae and Caesalpinoideae) was carried out. As many as 35 species of the genera *Acacia*, *Adenanthera*, *Albizia*, *Leucaena*, *Mimosa*, *Pithecolobium*, *Prosopis*, *Bauhinia*, *Caesalpinia*, *Cassia*, *Ceratonia*, *Delonix*, *Hardwiodia*, *Parkinsonia*, *Peltophorum* and *Tamarindus* were investigated by paper and thin-layer chromatography. A total of about 55 phenolics were isolated from the leaves out of which 10 were tentatively identified by using: authentic markers; Rf values as reported in the literature; fluorescence in UV colour reactions with spray reagents. Some of the compounds were partially confirmed to be phenolics. Ultraviolet spectral data of caffeic acid and Quercetin were obtained in the case of *Tamarindus indica*.

The extension project is aimed at establishing the importance of bio-chemical approach for taxonomic studies. The results of these investigations could be useful in determining plant relationships in a particular group on the basis of their distribution pattern and may help in clarifying the complexities in plant systematics.

B-BU/Bio (143)

Title: Study of Genetic Potential of Local Breeds of Sheep/Goats of Quetta.

Sheep and goats are common domestic livestock. Preliminary reports have indicated that twenty one (21) breeds of sheep and goats were being maintained in different regions/ environmental conditions of Pakistan. However, the exact number of genetic breeds being maintained in Pakistan in general, and Baluchistan in particular are not known. Very little biological data is available regarding their genetic potential and adaptability to different areas.

The project is aimed at collecting the basic data regarding different local breeds of sheep/goat being maintained in and around Quetta, studying various genetic reproductive potentials, disease resistance and turn over rate of these breeds.

The result of this study may provide a model for sheep/goat varieties better adapted to the pastures in the arid land of Baluchistan and with better potentials for commercial exploitation.

S-KU/Bio (151)

Title: Clonal propagation of *Carica papaya* and Extraction of Papain from it.

Carica papaya is a perennial herbaceous dioecious plant which is well known for its latex which contains two potent crystalline enzymes namely (i) papain and (ii) chymopapain. The latex of papaya is being used in the folk medicine; cosmetics; meat processing industry; tanning industry, etc.

The project is aimed at studying different species of papaya rich in papain content, for selection and propagation through *in vitro* methods. The alternative approach for getting large quantities of female plants would also be tested. Growth hormones and related chemicals would be applied as sprays on the seedlings at various stages of development in order to increase the incidence of female plants amongst the seedlings grown in field conditions. The procedure would ensure recovery of 100% female plants which would be true to the type with an additional advantage of being virus-free.

Clonal propagation of female plant of papaya, would help avoiding unnecessary cultivation of male plants up to flowering stage when sex of plants becomes apparent. The studies would also help in improving the fruit quality, latex yield and quantity of papain content in latex.

P-PU/Bio (153)

Title: Studies on the Stability of Hybrid Plasmids Carrying Segments of *Bacillus subtilis* in *E.coli*.

The ability to clone DNA from any organism represents the major breakthrough because of the extensive research work done in the last decade in the field of molecular biology. Not only has DNA cloning led to totally new approaches in almost all fields of biological research, but it also promises to effect profoundly the future of mankind because of its potential application in genetic engineering and pharmacology. Plasmids are the most commonly used vectors for cloning foreign DNA in host organism. High copy number of plasmids are the most commonly used vectors which facilitates the extraction of larger amounts of plasmid DNA and also help in the purification of

proteins encoded by cloned genes. However, cloning in high copy number plasmids often results in genetic instabilities of the cloned and vector DNA. Furthermore, some genes cannot be cloned in high copy number plasmids.

The project is aimed at determining the sequences of DNA which are responsible for either stability or instability of hybrid plasmids. The results of these investigations would contribute towards the improvement in the methodology of gene manipulation.

P-GC/Bio (156)

Title: Taxonomy and Biology of the Entomostraca of Northern Punjab.

Entomostraca forms a major subdivision of the Class Crustacea (Phylum Arthropoda), which includes Branchiopods, Ostracods and Copepods. They form an important link in the food chain, culminating at fish and other aquatic animals. A preliminary survey has revealed that fresh water bodies of Northern Punjab are very rich in Entomostraca. So far, about ninety species have been recorded and lot more are awaited to be discovered. They form a major part of the food of not only large carnivore fishes but also of fisherlings of majority of herbivore and carnivore fishes.

The project is aimed at (i) making a thorough Survey of Taxonomic nature of Entomostracan fauna from permanent and temporary freshwater boides (ii) identifying the food preferences of fishes and fisherlings and (iii) studying the Biology of most favoured species of Entomostraca with an effort to have mass culture.

The results of these investigations would be made available to agencies concerned with the development of fisheries.

CHEMICAL SCIENCES

C-QU/Chem (159)

Title: Synthesis and Development of Hybrogels for Sustained Release of Drugs.

There is a large variety of hydrophobic and hydrophilic polymers (hydrogels) which are attractive biomaterials as they resemble to human body's highly hydrated composition. Another bio-medical advantage of hydrogels may be related to their high permeabilities to water and small ions or molecules, thus providing a mean for making composition of drugs and ploymeric material for controlled release of water soluble molecules.

The project is aimed at developing (i) appropriate hydrogels for sustained release of long acting contraceptive hormones and (ii) safe and effective device for prolonged release of prostaglandins normally used for labour inducement.

The results of these investigations may find their way in improving the control of systematic drug levels in blood, eliminating patient compliance problems and localizing drug action at a particular body site.

B-BU/Chem (162)

Title: Chemistry and Biochemistry of Glycoprotein Sulfortransferases and Sulfate Acceptors.

A variety of glycoproteins obtained from epithelial secretions of gastric, pulmonary & cervical systems contain different amounts of sulphate groups on sugar residue. Rat gastric mucosa glycoproteins, as in man, contain sulfortransferases which catalyze the addition of sulfate from 3-phosphoadenylyl sulfate to a variety of glycoconjugates. Very little is known about the properties of glycoprotein sulfortransferases, their specifications, changes of titer with development and comparative biochemistry.

The project envisages purification, isolation and characterization of rat (model) gastric sulfortransferases, catalyzing the transfer of sulfate from 3-phosphoadenylyl sulfate to glycoproteins. Emphasis will be given to the preparation and characterization of acceptors which will be used for assaying glycoprotein sulfortransferases in development, pathogenesis and comparative biochemical studies.

It is expected that characterisation of these enzymes will permit better understanding of the biochemical regulation of sulfation of the glycoproteins and ultimate control of many of these functional properties of glycoproteins.

S-KU/Chem (163)

Title: Amino Acid Sequence Study on Hemoglobin and Venoms from Snakes Found in Pakistan.

Much work has been carried out on the chemistry of hemoglobin of different classes of vertebrates and invertebrates. However, there is little data available on the hemoglobin from class reptilia. The present study on the primary structure of hemoglobin from snakes, is undertaken to find the relationship

of reptilian hemoglobin with those of other vertebrate classes.

The project envisages to isolate the hemoglobin components from red blood cells, separate the polypeptide chains and determine their amino acid sequence. Hemoglobin will be extracted from the snake blood samples according to the Drabkin's method. Hemoglobin concentration will be estimated by photometric measurements at 540 nm. Further separation of amino acid chains will be carried out by employing gel chromatography and highly sophisticated electrophoretic techniques. After chemical cleavage, the amino acid sequence of the heme part of hemoglobin molecule will be determined.

In addition to this, amino acid sequence of the venom of cobra (Naja naja naja) will also be determined to investigate the presence of various toxic and non-toxic proteins present in the venom.

The results of these studies would provide data from comparing the reptilian hemoglobin with other known hemoglobins and establishing correlation between structural and functional relationship of the molecule.

P-CSIR/Chem (171)

Title: Biosynthesis of Antibiotic Bacitracin by *Bacillus licheniformis* as Supplement in Poultry Feed.

Bacitracin is a polypeptide antibiotic which is active against many gram-positive and a few gram-negative bacteria. This antibiotic has been used with reasonable success for the control of infectious problems of animals such as bovine mastitis, infected wounds, haemorrhagic septicemia otitis, enteritis (necrotic), infected keratitis, dermatitis and some types of dysentery. Feed supplements containing bacitracin in various forms, have proved to be quite effective and economical in (i) animal and poultry nutrition (ii) increasing feed efficiency and (iii) reducing infectious diseases. This antibiotic, at present, is being imported in the country as a supplement in poultry feed to the tune of 500 tons annually thereby involving substantial amount of foreign exchange. Its demand is increasing with the rapid development in feed industry for raising poultry and animals.

The project is aimed at (i) isolating and culturing of *B. licheniformis* from local environments and foreign culture collections for antibiotic fermentation, (ii) isolating and purifying antibiotic from the fermented mesh and (iii) undertaking feeding trials in poultry.

The results of these investigations may help in exploitation of local resources for the production of this antibiotic within the country.

S-SU/Chem (172)

Title: Application of High Performance Liquid Chromatography for Multi-elemental Analysis at Trace Levels Using Ketoamine Schiff Bases.

The enormous ability of the gas chromatography to separate and analysis the mixture of metal ions as metal complexes is now widely appreciated. Many metal complexes however cannot be handled by gas chromatography because either they are insufficiently volatile and cannot pass through the column or they are thermally unstable and decompose under the conditions of separation. High performance liquid chromatography (HPLC) on the other hand is not limited by volatility of the metal complexes and is better for their separation and quantitative determination.

The project is aimed at (i) studying the potentials of ketoamine schiff bases for multielemental analysis at trace level using HPLC, (ii) applying HPLC method for the determination of Copper, Nickel, Palladium, Platinum and Vanadium in geological samples and (iii) Comparing the analytical results obtained on HPLC with those on GLC for establishing the relative merits of these methods.

The proposed studies are expected to establish a useful correlation between HPLC, GLC and atomic absorption methods.

S-KU/Chem (173)

Title: Preservation of Food by Edible Plant Extracts.

Preservation of food with the help of chemicals is known to man from primitive ages. Salt, oil and smoke are still commonly used for preserving meat, fish, vegetables, etc. With the development of agricultural technology and increased yield of crops, other chemical substances have also found their uses as preservatives. Continued investigations on preservatives of chemical and plant origin have revealed that not only the chemical preservatives produce toxic effects but many of them are hazardous to health.

The project is aimed at exploring the possibility of using extracts from fruits and leaves of edible plants, having antimicrobial

crobial properties, as food preservatives. The extracts when used as preservatives will prove to be non-toxic and safe to health because their source is a part of human diet.

The results of these studies may help the investigators in suggesting toxic free preservatives to the food industry in Pakistan.

S-CSIR/Chem (174)

Title: Physico-chemical Studies on the Structure of Pure Liquids and Solutions and their Correlation with Concentration and Temperature Changes.

Recently, there has been increased interest in the study of molecular structure of liquids and solutions. The presence of higher order transitions is not only of considerable theoretical interest as regards the inherent intermolecular forces in liquids, but could have importance in physiological processes operative in animals and plants, in biophysics and in liquid crystals.

The project is aimed at studying the intermolecular aggregation and interaction in liquids such as ethyl, propyl, butyl, Isomyl alcohol and aqueous and non-aqueous mixtures of polar and non-polar compounds by measuring the temperature dependence of properties such as U.V. absorption, chemical shift and neutron scattering.

The results of these studies would lead to a better understanding of molecular interaction in liquids with reference to their structure. Hopefully, an improved generalized model explaining the behaviour and mechanisms of structural anomalies would be proposed.

C-QU/Chem (175)

Title: Estimation of Heavy Trace Metals in Various Local Fish Species and Relevant Marine/Fresh Waters.

The pollution of aquatic environment due to heavy trace metals is on the increase. The adverse effects of this sort of pollution on human health through the use of fish are well known and well documented throughout the developed countries. In Pakistan however, even the base line data on aquatic pollution is not available. There is thus a dire need to survey the aquatic environment for investigating the extent of pollution due to heavy trace metals.

The project is aimed at surveying the local fresh water bodies as well as the marine water that serve as breeding places

for various species of fish for the estimation of heavy trace metal concentrates like Mercury, Cadmium, Zinc, Lead, Chromium, Iron and Nickel in the edible fish species. The overall pollution problem will be examined for toxicity/non-toxicity limits.

The data thus obtained would warrant not only to safeguard human health against the potential pollution hazards but will also allow proper implementation of related regulatory laws.

B-BU/Chem (177)

Title: Studies on the Chemical Constituents of Some Labiatae Plants of Pakistan.

Different species of plants belonging to the family Labiatae are well known for their medicinal properties and are used in curative preparations in traditional medicine. Many of these plants have been subjected to chemical studies and a large number of active organic compounds with useful pharmacological activities have been isolated and their structures determined.

The project envisages detailed investigations on the chemical constituents and biological screening of pure chemical compounds isolated from the plants belonging to three genera of family Labiatae viz: Saliva, Teucrium and Leucas.

The results of these investigations may yield some pharmacologically active compounds.

B-BU/Chem (178)

Title: Immobilization of Enzymes and their Applications in "Flow Injection Analysis" for the Determination of Substrates of Diagnostic Importance.

Enzymes play an important role in substrate analysis because of their selective and sensitive nature as reagents. However, their instability and high cost restricts their involvement when continuous flow systems are employed. The problems can be decreased if these remarkable reagents are "Immobilized", i.e. localizing the enzyme molecules to water insoluble supports with retention of their catalytic activities, which can be used repeatedly or continuously.

The project is aimed at immobilizing enzymes of diagnostic importance on a suitable support to obtain an active enzyme derivative for repeated and continuous use in mini columns in a flow injection system for the analysis of substrates of clinical importance.

The study would help in developing cheaper and simple analytical procedures which in due course, may lead to saving foreign exchange on the import of analytical kits used for biochemical studies.

EARTH SCIENCES:

C-PMNH/Earth (30)

Title: The Interpretation and Economic Impact of the Palaeo-Environments during the Pre-cambrian/Cambrian Times in Salt Range and Potwar Plateau.

The Pre-Cambrian to Cambrian rocks in Salt Range area are well known amongst the field workers but they are least investigated in laboratory to find out environmental conditions of their deposition. There is thus a need for systematic field studies coupled with laboratory investigations on the geochemistry, mineralogy and sedimentology of these rocks.

The project envisages (i) collection of samples from areas representing the whole of Salt Range (ii) measuring their stratigraphic sections and marking exact locations and (iii) analysing these samples in the laboratory for major and minor elements both qualitatively and quantitatively to interpret the ancient environment at the time of deposition.

The results of these investigations may prove helpful in (i) the economic exploitation of minerals such as sandstone and dolomite and (ii) understanding the Palaeo-environment during Pre-cambrian/Cambrian period.

AJK/Earth (32)

Title: Stratigraphic Analysis of Mesozoic and Paleogene Rocks of Hazara, Azad Kashmir and Adjacent Areas of Rawalpindi District and Islamabad and Variations in Kohat, Potwar Province of Indus Basin.

Over 90% of exposed rocks in Pakistan in general, and the project area in particular, are related to stratified group of rocks. The occurrence of mineral deposits is governed by the quality and quantity of rock groups in the region. Rocks, that are selected for stratigraphic analysis, are dominantly the source rocks for oil and gas in Kohat Potwar Province of Indus Basin. These rocks also contain some important metallic, non-metallic

and industrial minerals, such as iron ores, aluminous rocks, laterite, lime stone, dolomite, fireclay, coal, silica sand etc.

The project is aimed at studying the (i) facies variation thickening and thinning effect of unconformities within the project area with respect to Kohat Potwar Province of Indus Basin (ii) Furthermore, paleoenvironments and Paleosedimentology of the area will also be investigated.

The proposed study is expected to establish correlations of various units within the project area and set trends in the occurrence of industrial mineral rocks and source rocks for oil, gas etc. in respect of adjacent regions.

AJK/Earth (33)

Title: Petrology and Geochemistry of Panjal Volcanics in Poonch, Muzaffarabad and Kaghan Valley.

Basic volcanic rocks extend from Kahutta to Muzaffarabad and enter into Hazara Area. Little systematic work has been done to evaluate mineralogy and geological setting of these rocks in various parts of Azad Kashmir.

The project is aimed at surveying, mapping and detailed study of mineralogical and geo-chemical characteristics of Panjal Volcanic flow as well as associated agglomeratic rocks in order to determine their economic potential.

The results of these studies may indicate the presence of Ni, Cu, U, etc. in sizeable economic deposits.

AJK/Earth (37)

Title: Petrotectonic Elements and Tectonic Framework of North-West Himalaya.

Eversince the start of modern geological studies in Himalayas during 19th century, voluminous data has been collected by a number of eminent workers. However, Himalayas, the most prominent of all mountain systems in the world, still remain relatively unexplored. The relative paucity of field data and geological mapping coupled with a few attempts at synthesis has kept the evolutionary history of the Himalayas fairly unresolved especially of the part that falls within Pakistan. With the advent of the new theory of Plate Tectonics, it is now possible to understand mineralization, sedimentation, seismicity and other historical phenomena, once realistic tectonic model areas have been built.

The project is aimed at reviewing and compiling all available geologic information on North-West Himalaya as well as undertaking fresh field work and laboratory studies to enhance the present tectonic models of the area. The study will open new vistas of research in many related geologic fields. The result of these studies would assist in mineral exploration and understanding seismotectonic provinces to meet natural hazards.

ENGINEERING SCIENCES:

E-PU/Eng (24)

Title: Conservation of Electricity in the Field of Air-Conditioning.

The conventional type of evaporative cooler which consumes lesser amount of power, works efficiently in dry season from May till start of Monsoon in July. After Monsoon, it becomes least effective due to rise in humidity of recirculated or fresh air sucked by the evaporative cooler. As a consequence, the use of air conditioning units in the country has gone up to such an extent that they consume substantial amount of electrical energy.

The project is aimed at designing and fabricating an equipment which will control the humidity of fresh or recirculated air in our evaporative cooler. The dehumidification of incoming air will consume less than 100 watts of electricity which can also be met from alternative sources such as natural gas, Kerosine oil or LPG.

MEDICAL SCIENCES:

P-PMI/Med (109)

Title: Sodium Transport in Erythrocytes of Patients with Treated and Untreated Essential Hypertension.

In the vast majority (approx. 90%) of patients with hypertension, the etiology is unknown and they are classified as having essential or primary hypertension, which results from a combination of genetic and environmental factors. One of the most important factors is the excess of Na^+ (Sodium) intake. In the body, sodium load resulting from sodium intake is transitory because it is rapidly corrected by an active sodium - potassium pump, while the excess of sodium in the extracellular fluid is mainly corrected by the kidney excretion.

The project is aimed at finding the effect of Na^+ - K^+ Co-transport activity in red cell membrane in essential hyperten-

tension both before and after treatment as well as to determine a useful genetic marker for susceptibility to essential hypertension by including normotensive subjects with family history of the patients.

The result of this study may help in explaining the mechanism of sodium transport in red blood cells of treated and untreated essential hypertension patients and to devise curative measures for the same.

S-JPMC/Med (114)

Title: Acquired Immune Deficiency Syndrome: Sero-Epidemiology and Surveillance.

Acquired immune deficiency syndrome (AIDS) is an immunoregulatory disorder that was first recognised in 1981, when a dramatically increased incidence of *Pneumocystis carinii* pneumonia and Kaposi's Sarcoma was observed in male homosexuals. According to World Health Organization, cases of AIDS have been reported from every continent and the disease has become a major public health problem in a number of countries most notably in the US and certain European and African countries.

Human T cell Tropic Retrovirus (HTLV)-III/LAV infection precedes the disease manifestations by months to years, leading to full blown AIDS. Early recognition of HTLV-III/LAV infection can be achieved by serological evidence of virus in the blood, Although only a small proportion of people (5-20%) infected with HTLV-III/LAV developed overt AIDS, it is extremely important to identify these asymptomatic persons, as they comprise a major reservoir and a potent threat to the spread of AIDS.

The proposed studies would provide data for surveillance of AIDS (as recommended by WHO). Moreover, screening of potential blood donors will help in prevention or spread of AIDS and in formulation of recommendation for (or against) routine screening of blood donors.

B. INSTITUTIONAL SUPPORT:

Pakistan Science Foundation assists the Universities in the provision of equipment, chemicals, literature etc., to research workers who for one reason or another, are unable to obtain these from their own institutions. The main emphasis is on (i) equipping multi-disciplinary research units which are involved in solving of problems in high priority areas of research and (ii) provision of literature, staff training and data processing, facilities to build up the research capability of research centres/units.

During the report period an amount of Rs.0.093 million was sanctioned as institutional support to various Universities/R&D organisations for the purchase of certain items and equipment (Annexure-III).

FUNCTION III Utilization of Research Results

Utilization of the results of Scientific and Technological Research including pilot plant studies to prove the technical and economic feasibility of processes found to be promising on a laboratory scale.

During the report year, no suitable project was received by the Foundation for inclusion in the above programme. Hence no grant was sanctioned/released under this head. So as to promote awareness about the results obtained through indigenous research, the summaries of PSF funded scientific and technological research projects (1974-1985) were published in book form and distributed to R&D Organizations and Universities.

FUNCTION IV

The establishment of Science Centres, Clubs, Museums, Herbaria and Planetaria.

One of the major statutory functions of the Pakistan Science Foundation is to popularize science among the masses, by establishing Science Clubs, organizing Science Fairs, arranging popular Science Lectures, showing scientific films and publishing of articles on scientific/technological topics in National dailies. The following are some of the major activities carried out by PSF during the year under report.

(1) Science Exhibitions/Fairs

PSF continued supporting Boards of Intermediate and Secondary Education to organize annual science fairs for students. During the period under report, grants totalling Rs.130,000/- were sanctioned/released to the organizations listed below for holding such events:-

<u>Organizing Agency</u>	<u>Event</u>	<u>Grant Released</u>
Bureau of Curriculum and Extension Centre, Department of Education, Quetta, Baluchistan.	5th Scientific Exhibition	Rs. 40,000/-
Board of Intermediate and Secondary Education, Hyderabad, Sindh.	Science Fair	Rs. 50,000/-

Board of Intermediate and Secondary Education,
Sargodha, Punjab

Science Fair

Rs. 40,000/-

(2) Funding for Summer/Winter Schools in Science for Talented Higher Secondary School Students.

5th Summer School for Talented Students in Science at Khanspur was arranged in collaboration with Board of Intermediate and Secondary Education, Lahore. Eminent Scientists/Educationists delivered Lectures on a variety of topics related to Science and Technology to the students. Pakistan Science Foundation provided a grant of Rs.25000/- to the School.

(3) Popular Science Lectures

A regular program of monthly popular science lectures has been initiated since September 1986. The invited speaker (Scientists/Educationists) express themselves in non-technical language to the mixed audience comprising scientists/scholars/students and the general public. The following lectures were held during the year 1986-87:-

<u>Month</u>	<u>Name of Speaker</u>	<u>Topic of Lecture</u>
September, 1986	Dr. Sadiqa Malik Director, Botanical Sciences Division, Pakistan Museum of Natural History, Islamabad.	Poisonous Plants of Pakistan
October, 1986	Maj. General (Retd.) M.I. Burney, Executive Director, National Institute of Health	National Institute of Health and its Role in Scientific Research
November, 1986	Dr. Ishafaq Ahmad Member (Technical) PAEC	Nuclear Energy for Development with special references to Pakistan.
December, 1986	Dr. M.H. Qzai Chairman, Department of Biological Sciences, Quaid-i-Azam University, Islamabad.	Recent Advances in Molecular Endocrinology.
January, 1987	Dr. Miss Iftikhar Hasan Dean, Basic and Applied Sciences, Allama Iqbal Open University.	Distance learning in Third World Countries

February, 1987	Dr. Tahir Hassan Vice Chancellor University of Azad Jammua & Kashmir.	Development of Science in Edcational Institutions.
March, 1987	Haji Habibur Rehman Managing Director, National Polic Foundation	Science of Crime
April, 1987	Dr. Todd Silver, Research Fellow, Massachusetts Institute of Technology, USA	The Role of Arts in Uses of visual Metaphors Similes and Analogical thinking.
April, 1987	Mr. A.H. Daulay, Chief Scientist, General Arid Zone Research Institute, Jodhpur, India.	Aird Land Resources and their Management for Optimizing Crop/Plant Production.
June, 1987	Mr. J.C. Mba-Nze, Programme Specialist, UNESCO.	Data Base on Science and Techfology Potential.

(4) Popular Science Film Shows:-

The Pakistan Science Foundation has established a Library of highly interesting and informative Science Films including those prepared by the Britannica Films, National Film Board of Canada, the Allama Iqbal Open University and the USIS. The total number of Science films with PSF are :-

16 mm	-	35 Nos.
Video (VHS)		125 Nos.

Since September 1986, a regular programm of weekly science film shows for schools, (in school's premises) has been established. A total number of 31 such shows have been arranged during the period under report.

VCR Science Films have been donated to a number of educational institutions in the country. Audiovisual equipment (TV/VCP sets) was also provided to some of them along with the films. Films of 88 hours duration have been donated to 12 different institutions in all the four provinces to be shown to students. Besides, 3 sets of TV/VCPs and a computer with accessories have also been donated to 4 institutions in Northern Areas, N.W.F.P., Baluchistan and Rawalpindi.

(5) Planetarium Shows:

Since the acquisition of a portable planetarium by PSF in late 86, 53 Planetarium shows have been arranged in eight schools in Islamabad/Rawalpindi. Besides eight planetarium shows were also held at 'Science Week' organized by the Kashmir Society for Scientific Research in Muzaffarabad, Azad Kashmir, in April, 1987.

(6) Distribution of Science Books and Magazines:

PSF distributes Science Books and Magazines to educational institutions in the country free of cost. It also subscribes for popular science magazines such as "Jadid Science." "Science Bachoon Key Lye" and "Science Digest" (Urdu) for schools and colleges. Distribution undertaken during the year 1986-87 is detailed below:-

<u>Magazines (in Urdu)</u>	<u>Donated to</u>
Jadeed Science (Jan - June 1987)	Four hundred High Schools in the country.
Science Bachoon Kye Lye (Jan - June 1987)	-do-
Scienc Digest	60 Schools of AJK, Baluchis- tan and Northern Areas.
<u>Books</u>	
5 sets of Science Books. (36 Books per set published by Ferozsons Ltd and National Book Foundation).	4 Schools of Northern Areas and special education school for Deaf Islamabad.
One set of 28 volume Encyclopedia "Science & Technology" Illustrated.	Govt. Degree College for Men, Gilgit.

Also, 500 copies each of the following Books were purchased by the Foundation for distribution amongst the educational and research organizations in the country.

- i) Islam and Evolution of Science by Mohammad Saud.
- ii) 'Quranic Ayaat Concerning Reference to Science and Technology' by M.M.Qureshi, S.M. Bhutta and S.M. Jaffer.

400 each of the above books have been donated to 262 Degree Colleges and 136 R&D Institutions.

Summaries of PSF funded Science Projects were edited and compiled in book form and published under the title:-

"Scientific and Technological Research Projects Funded by PSF, 1974-1985, Vol-I". The publication was mailed to R&D Organizations, Universities and to Principal Investigators of the Projects. A total of 258 copies were distributed.

(7) Science Promotion through Press

Science Promotion Officer, PSF publishes regular features entitled 'Science Diary' in national dailies. These diaries focus on science related events in the country. Number of articles published during the period under report are forty one (41).

(8) Science Quiz Competitions

An Inter-collegiate quiz competition in Science, organized by F.G. College for Women, Rawalpindi was sponsored by the Pakistan Science Foundation. Cash prizes amounting to Rs.5000/- for the winners were provided by the Foundation.

(9) Science Posters

Pakistan Science Foundation has prepared packages of posters in Science related themes for free distribution to Higher Secondary Schools through out the country. Attractive pictures in colour illustrating scientific topics help greatly in generating interest for science amongst the students.

During the period under report (1986-87) the first package of 10 posters was prepared in the Foundation. This included two portraits of great Muslim Scientists namely; Aviseana and Zakaria Al Razi, and eight posters on different science related themes. Six thousand copies of each poster were printed. The posters sets were mailed to 5000 Higher Secondary Schools in the country and also to various R&D organizations in specially designed corrugated containers.

(10) Science Posters Contest

The Foundation in collaboration with the Boards of Intermediate and Secondary Education organizes Science Posters Contest among high school students (both boys & girls) at the level of each board. The best three posters selected by each board are awarded cash prizes and are also included in an Inter-Board competition at the National Level. The winners of the national competition are also awarded with cash prizes. The theme for the 1986-87 contest has been Science in the Service of Humanity.' Studens from the Boards of Intermediate and

Secondary Education, Karachi, Hyderabad, Sukkur, Multan, Lahore, Gujranwala, Rawalpindi, Sargodha, Peshawar, Quetta and the Federal Board (GHQ) Rawalpindi participated. Certificates were also awarded to the participants winning prizes.

(11) Preparation of Scientific/Technological Exhibition & Display for COMS-TECH for the 5th Summit of OIC in Kuwait (26-29th Jan., 1987).

In response to a request of Ministry of Science and Technology, PSF designed and prepared an exhibition of S&T for display at the 5th Summit of OIC at Kuwait (held on 26th - 29th January, 1987). The exhibits included:-

- 1) Twelve portraits of eminent Muslim Scientists.
- 2) Twelve panels depicting various aspects of Science and Technology.
- 3) Computers.

The exhibition was highly appreciated by Heads of various Islamic countries attending the summit.

(12) Portraits of Eminent Muslim Scientists:

Twelve portraits of eminent Muslim Scientists, were prepared and presented to the Islamic Academy of Sciences, Amman, Jordan.

(13) Science Corners

PSF offers help in the form of exhibits and expert guidance to the Educational Institutions interested in setting up miniature Museums or Science Corners of their own. The emphasis is on the natural wealth of the area. Exhibits for Science Corner were donated to Board of Intermediate and Secondary Education, Hyderabad.

(14) Science Caravan: Promotion of Science in Rural Areas.

The Science Caravans are Mobile Science Exhibitions containing a variety of Scientific and Technological material, to present Scientific concepts to school children in rural areas through simple diagrams, models, eye catching mechanical displays bright posters, interesting Science films and video recordings. They also carry mobile Planetarium and colourful slide shows on scientific topics and computers. During the period under report, PC-I for the project was prepared and approved by D.D.W.P. Preparation of the displays was initiated and purchases of the relevant equipment (Audiovisual & others) were made.

(15) Pakistan Museum of Natural History.

The Pakistan Museum of Natural History is presently housed in rented buildings in Sector F-7/2. The PC-I (Phase-II) of the Museum which includes the construction of its permanent buildings has been approved by ECNEC in April, 1986. Five acres of land have been acquired from Capital Development Authority at Shakar Parian, Islamabad. Designs of the buildings prepared by PEPAC have been approved.

The primary objectives of PMNH include inter alia, Research, Reference collection, exhibits/displays for public education/awareness about the country's rich Natural History Heritage and for developing Natural Resources conservation attitude of the people. The museum at present consists of following four sections:-

- 1) Botanical Sciences Division
- 2) Earth Sciences Division
- 3) Zoological Sciences Division
- 4) Public Services Division (including Design Section).

Summary of the progress made by Pakistan Museum of Natural History during the year 1986-87 is given below:-

A. **BOTANICAL SCIENCE DIVISION**

Reference Collection.

Collection of Flora: Northern Areas of Pakistan were surveyed for plant collection and ethnobotanical studies. About 1100 plant specimens were collected from these areas.

Two field trips were undertaken to Dunga Gali, Bansra Gali, Khaira Gali, Kuza Gali, Satra Meel, Bara Kau, Lower Topa, Jica Gali, Lehtrar etc. and about 425 plant specimens were collected from these localities.

A series of field trips were organized to undertake the collection of non-vascular plants. (Algae and Fungi) from Wah Cantt. area and Punjar Valley. The collection includes 20 algal specimens from Wah Cantt. area and 72 Fungal specimen from Punjar Valley.

All the collected plant specimens were mounted on Herbarium sheets. Seven hundred & eighty higher plants were identified and arranged systematically in Herbarium of PMNH. About 45 plants including 10 cultures of Fungi were identified. In addition about 170 Algal specimens were also catalogued.

Research

A number of studies were completed during the report period. They include:-

- Checklist of plants from six districts of Baluchistan.
- Study of Margalla Range Vegetation.
- Study of Blue-Green algae as nitrogen fixers.
- Some green algae of Islamabad.
- Seven species of Hyphomycetous Fungi.

Research Projects in Progress are :-

- Taxonomical studies of weeds of wheat fields of Bannu District.
- Investigation of poisonous plants of Pakistan.
- Detailed studies of the plants belonging to family Liliaceae in Rawalpindi, Islamabad, Abbottabad and Mansehra Regions.
- A study of vegetation and soil relationship in Islamabad and Rawalpindi Districts.
- Observations on the vegetation of Islamabad.
- Eco-taxonomic studies of family Labiatae of Northern Areas of Pakistan.
- Various Ecological observations on the vegetation of Margalla Range.
- Studies of Genus *Neocospospora*.
- Effect of Aqueous extract of *Cannabis sativa* on selected cultivated plants and evaluation of net aerial primary productivity of grass land area in Islamabad.

Services Rendered to other Organizations.

A report on Medicinal plants of Dera Bugti was submitted to Forest Department, Government of Baluchistan at their request. Miniramas and exhibits including that of Marine plants, cultivation of Mushrooms; Tissue culture and Toxic plants were prepared for Sargodha Exhibition.

Seminars/Lectures.

The lectures/seminars delivered from time to time including "Various Ecological Observations on Vegetation of Margalla Range; "Some Blue Green Algae"; "Evolution of Angiosperm Flower" and "Plant Ecology, with reference to vegetation of Margalla Hills" were also organized by the Botanical Sciences Division.

B. EARTH SCIENCES DIVISION

Reference Collection

- Collection of Rocks, Minerals, and Fossils: Geological studies alongwith extensive collections were undertaken in parts of Kalar Kahar - Diwalian areas of Chakwal District, Bajaur, Mohamnad and Malakand agencie, Dir and Swat Districts, and also from the Pubbi Hills and Southern Talagang Tehsil. 175 sedimentary and 80 igneous/metamorphic rock samples, 300 vertebrate and 20 invertebrate fossils, and 45 mineral specimens were collected from these areas.
- In addition, 35 specimens of vertebrate fossils from the Haro River area (District Attock) and 10 invertebrate fossils from Khuzdar (Baluchistan) have also been added to the Reference collection through donations from the Geological Survey of Pakistan.

Research

- Petrographic studies of 68 igneous and metamorphic rocks of Bajaur, Malakand, Dir and Swat area were completed.
- Field report incorporating field observations and petrographic studies on the Malakand, Dir and Swat areas was formulated.
- 30 samples and 390 slides of the Makran coast clastic sediments for x-ray diffraction analysis were completed.
- Powders of 22 samples for DTA analysis from the off shore well near Karachi have been prepared. In addition, 264 slides have been made for X-ray analysis. Detail work is in progress.
- 46 samples from the permian Warchha Formation and 20 samples of the Tobra Formation from the eastern Salt Range were prepared for mineralogical analysis by XRD method.
- Washing and picking of Formaminifera from the Patala Formation of the Kala Chitta Range was done.
- 2200 specimens of Foraminifera and Ostracoda

from the Patala Formation were separated and preliminary identification was completed.

- About 4000 Kg of sediments from the Chinji Formation and parts of Chakwal District were processed for small mammals collections.
- Research work about the clay mineralogy, sedimentology and conditions for the preservation of organic carbon in the south eastern shelf of Pakistan was carried out.
- 395 small mammals, fish and crocodalian specimens were separated and identified.
- A research paper on the small Mammals of Dhok Thalian, District Chakwal, was formulated.
- Taphonomic studies through measurement of 46 artiodactyla and 25 perissodactyla specimens from Mirpur Quarry were carried out.
- Detailed identification and description of 50 bovid specimens from the southern Potwar plateau was done.

Services Rendered to other Organizations/Personnals.

- General description of rocks, minerals and fossils alongwith specimens were provided to the Board of Intermediate and Secondary Education, Hyderabad.
- Lectures were delivered on the Geology, Geological processes and Geo-history to the students of different colleges.
- Consultancy services were rendered to mine owners about the projects of economic minerals in Salt Range and other areas of Pakistan.

C. ZOOLOGICAL SCIENCES DIVISION.

Reference Collection

Collection of Fauna: field trips were conducted in the areas of Chakwal, Dir, Chitral, Swat, Gilgit, Hunza, Galiat, Azad Jammu and Kashmir and Karachi Coast. Large number of samples including 600 insects, 1800 fishes, 50 reptiles, 709 birds and mammals, 570 marine animals and 70 land invertebrates were collected.

Laboratory Work.

About 3600 fishes, 800 insects, 50 birds, 30 reptiles and 90 mammals were identified and catalogued.

Research

During the report period, following research studies were completed:-

- Cluster analysis of some morphological characters of house sparrow.
- A contribution to the fishes of Haro River.
- Studies of agamid lizards of northern Pakistan and
- Detailed study of economically important aquatic iptera.

The studies in progress are as under :-

- Study of Ichthyofauna of Malakand Division and other Ichthyo - ecological zones of Pakistan.
- Estimation of FSH, LH and prolactin in the plasma samples of mongoose.
- Morphometric studies of the amphibians of northern Pakistan.
- Morphometric studies of the lizards collected from northern Pakistan.

Services Rendered to other Organizations.

Following assistance was provided for the PSF Science Caravan Project:-

- Stuffed specimens and Biological exhibits, mounted specimens on glass slides, and description of exhibits.
- Training of Caravan Staff in operating computer and portable planetarium.
- Hashmat Islamia College was imparted taxidermy training for preparation of stuffed animals for their Science exhibition.

D. PUBLIC SERVICES DIVISION DESIGN SECTION.

Public Awareness Programmes.

- A display of medicinal plants and fishes of Pakistan was arranged at NARC, on the occasion of the World Food Day, organized by the FAO in collaboration with PARC.
- Display of Natural History specimens of Pakistan plants animals, rocks, minerals and fossils was arranged at the Science Fairs, organized by the Board of Intermediate and Secondary Education, Hyderabad and Sargodha.
- One land scape and seven birds were painted for the book entitled "Birds of Islamabad" which will be published by the PMNH Staff.

Assistance Rendered to other Divisions of PMNH.

- Design Section is responsible for designing, fabricating, modelling, manufacturing and repainting of small laboratory fixtures and storage cabinets.
- Visual and art-work for the PMNH newsletter.
- Reprints of request cards, visiting cards and other stationary items.

Services Rendered to other Organizations.

- Structures exhibits, photographs and write-ups were completed for PSF Science Caravan.
- Prepared and installed Science exhibition for the 5th Islamic Summit.

FUNCTION - V Scientific Societies and Learned Bodies:

Promotion of learned bodies, scientific societies/associations and academics, engaged in spreading the cause of scientific knowledge in general or in the pursuit of a specific scientific discipline or technology in particular:

The Foundation is making annual grants to the well established active learned bodies and scientific societies and endeavouring to provide all possible assistance to the new ones, subject to availability of funds. Annual grants amounting to Rs.0.180 million were released during the current year to various Non-government Organization/Scientific Societies (Annexure-IV) for the achievement of their approved objectives.

A number of scientific societies/institutions are regularly publishing journals or magazines to popularise particular scientific

disciplines or popularize science among students. Such societies/ associations have been given grants totalling to Rs.0.119 million (Annexure-V) for their publication programmes.

FUNCTION VI Science Conferences:

Organization of periodical Science Conferences, Symposia and Seminars.

The Foundation provides financial assistance for national and international Science Conferences, Seminars, Symposia and Workshops held in Pakistan. During the period under report grants totalling Rs.450,000/- were given to the following scientific organizations and institutions for the organization of such events:-

<u>Name of the Event</u>	<u>Organizing Agency</u>	<u>Grant Released</u>
6th Pakistan Congress of Zoology	The Zoological Society of Pakistan	30,000/-
3rd National Polymer Science Symposium at Baragali Camp.	National Centre of Excellence in Physical Chemistry, Peshawar University.	20,000/-
Training Course on Pesticide Application Technology for Cotton Crop.	Sind Agriculture University, Tandojam.	10,000/-
Seminar on Garbage Fired Power Station.	Institute of Electrical Engineers, Pakistan (Lahore Centre).	10,000/-
Seminar on Science & Industry	PASTIC Sub-Centre Quetta.	20,000/-
Poster Exhibition	Postgraduate Medical Institute, Lahore	10,000/-
International Workshop on Isolation & Structure Elucidation of Natural Products using Spectroscopic Techniques.	H.E.J. Research Institute of Chemistry, University of Karachi.	50,000/-
Workshop on future policies Regarding Food Processing and Preservation in Pakistan.	Pakistan Council of Scientific & Industrial Research Laboratories, Lahore.	30,000/-

All Pakistan Mathematical Conference.	University of Sind, Jamshoro.	25,000/-
International Symposium on the Conjunctive use of surface and Ground Water for Agriculture.	Centre of Excellence in Water Resources Engineering, University of Engineering & Technology, Lahore.	20,000/-
APWA Workshop on Teaching of Physics.	APWA Government College for Women, Karachi.	10,000/-
Training Course in Environmental Planning and Management.	National MAB Committee and National Science Council of Pakistan.	25,000/-
International Symposium/ Workshop on the Application of Genetic Engineering.	Centre for Advanced Molecular Biology, University of the Punjab, Lahore.	25,000/-
29th I.E.P. Annual Convention	Institution of Engineers Pakistan. (Lahore Centre)	25,000/-
Albert Einstein Seminar on 20th Century Physics & Technology.	Albert Einstein Society and Department of Physics, University of Karachi.	20,000/-
National Seminar on Sheep and Goat Production.	Faculty of Animal Husbandry & Veterinary Sciences, Sind Agriculture University, Tandojam.	20,000/-
5th All Pakistan Geographical Conference.	Department of Geography University of Karachi.	15,000/-
International Seminar on Management of Arid Lands.	National MAB Committee and Pakistan Academy of Sciences, Islamabad.	30,000/-
2nd International Seminar on Quran & Science.	Pakistan Association of Scientists and Scientific Professions.	30,000/-
National Seminar on Metallurgy.	Pakistan Institute of Metallurgical Engineers, University of Engineering & Technology, Lahore.	10,000/-

Symposium on Statistics in Science and Technology. Pakistan Council for Science and Technology, Islamabad. 25,000/-

FUNCTION VII Exchange of Visits

Exchange of visits of Scientists and Technologists with other Countries.

The Foundation facilitates the participation of scientists, Engineers and Doctors in International Conferences by providing them travel grants. Such grants enable the scientists to present the findings of research carried out by them in International Meetings and exchange information regarding recent advances in their respective fields of specializations.

Grants totalling Rs.0.369 million were sanctioned during the report period to 18 scientists (Annexure-VII) for attending International Conferences/Symposia and to meet their counterparts in institutions of higher learning in advanced countries.

FUNCTION VIII Awards and Fellowships:

Awards, prizes and fellowships are granted by PSF to individuals engaged in developing processes, products and inventions of economical importance in order to provide incentive for valuable applied research. The Foundation did not receive any proposal of scientific merit during the year under report Accordingly, no award was sanctioned under this programme.

FUNCTION IX Survey and Statistics:

A project entitled "S&T in the Muslim Ummah and its Methodical Development" costing Rs.0.383 million for 3 years had been sanctioned during 1985-86 to the Pakistan Academy of Sciences. Rs.0.143 million was released on account of 3rd and 4th instalment of the project grant during the year under report.

Under this project, lot of data has been collected from various agencies and so far, following monographs have been published:-

- i) Quranic Ayaat containing reference to Science and Technology and
- ii) S&T Development Profile of Muslim Countries.

FUNCTION X Research Evaluation:

The Foundation evaluated the technical/fiscal reports received during the report year as per procedure laid down for reviewing the progress of scientific research supported by the Foundation and evaluating the results of such research.

i) Semi Annual Reports:

Thirty semi-annual reports were scrutinised by the Science Wing of PSF to assess the interim progress of these projects.

ii) First & Second Annual Reports:

As many as nineteen (19) first annual and seven (7) second annual reports submitted by the Principal Investigators, after initial scrutiny by the Science Wing, were sent for detailed evaluation to the scientists/experts in relevant fields of study. These progress reports alongwith the evaluation reports of the experts were then submitted to the relevant Technical Committees for consideration and opinion.

iii) Eight (8) final reports in respect of the completed projects received during the year under report, were also sent to the subject experts for evaluation and on receipt back from them, submitted to the relevant Technical Committees for consideration and adoption.

FUNCTION XI Scientists Pool

Bio-data of some of the Pakistani Scientists living abroad and interested in returning to Pakistan were circulated to various universities and research organizations in order to assist them in finding jobs, suited to their qualifications.

During report period no request for appointment on the PSF Scientists' Pool was received by the Foundation.

FUNCTION XII International Liaison

Liaison with International Agencies and Scientific Establishments in different countries serves as a means to solve numerous scientific problems by sharing knowledge, exchange of expertise, collaborative research etc. Such agencies were accordingly contacted. Besides, representatives of several foreign organizations paid visits to the Pakistan Science Foundation in order to explore possibilities of collaboration in scientific programmes of mutual interest:

Memorandum of Understanding between the Royal Society of London, U.K. and the Pakistan Science Foundation.

The M.O.U. with Royal Society was signed in 1981, initially for a period of 5 years. During report period the memorandum was renewed for a further period of five years.

- One Pakistani Scientist namely Dr. S. Riazuddin, Director, Centre for Advanced Molecular Biology, University of the Punjab, New Campus, Lahore, visited various research institutions in U.K.
- Whereas, one British Scientist, namely, Dr.J.L. Wardell, Department of Chemistry, University of Aberdeen, U.K. visited Chemistry Institutes and Departments of the Universities at Karachi, Quetta, Lahore and Islamabad. The local hospitality during his stay in Pakistan was borne by Pakistan Science Foundation. An expenditure of Rs.20,600/- was incurred in this regard.

B) Memorandum of Understanding between the US National Science Foundation and the Ministry of Science & Technology.

US-National Science Foundation Special Foreign Currency Programme.

Pakistan Science Foundation is acting as a focal point for US-NSF collaborative research projects submitted by individual scientists from various Universities in Pakistan. During the report period following grants were released for the collaborative research projects/Conferences.

Project Title	Amount released(in mill.)	Name of Investigator/ Organizer.
i) Chromosome Number of Vascular Plants of Pakistan PSF/C-Res/NSF (30)	0.450	Dr.S.I.Ali, Professor Botany, University of Karachi, Karachi.
ii) Study of Restriction Enzymes.	0.350	Dr.S.Riazuddin, Director, Centre of Excellence in Molecular Biology, University of Punjab, Lahore.

- | | | | |
|------|---|-------|--|
| iii) | Study of Age and
Tectonic History of
Karakorum Hindu Kush
Range Land-Intermountance
Basins of Northern
Pakistan.
PSF/C-Res/NSF (28) | 1.376 | Prof. Dr. R.A. Khan
Tahir Kheli,
Centre for Excellence,
in Geology, Peshawar
University, Peshawar. |
| iv) | International Conference
and Workshop on in-
Vitro Selection and Pro-
pagation of Economic Plants.
PSF/C-Res/NSF (44-3) | 0.196 | Dr. Ihsan Elahi,
Botany Department,
Peshawar University,
Peshawar. |
- C) The Director, PASTIC, Dr. Aejaz A. Malik, who was nominated by the Pakistan Science Foundation, attended the ECO meeting held in Turkey during September, 1986.
- D) The lectures delivered by the Experts during the Seminar on the "Mechanical Behaviour of Materials" which was organized by the Pakistan Science Foundation in June, 1986, were duly compiled and sent to the Libraries of 33 participating institutions for reference and record.
- E) The Pakistan Science Foundation conveyed its concurrence for the appointment of Dr. Junaid Zaidi as Director TIPS, National Bureau in Pakistan, to the TIPS Headquarter in Rome.
- F) Foundation's concurrence to host the Saudi Delegation headed by the Dr. Abdullah Bakr, Rector, University of Petroleum and Minerals Technology, Kingdom of Saudi Arabia, during their visit to Pakistan in October, 1986 was conveyed to the Ministry of Science and Technology. The detailed programme for Saudi Delegation visit to various Universities and Institutions was worked out. The visit, however, could not materialized due to other engagements of Dr. Bakr in his own country.

CHAPTER - 2

PROGRESS OF PSF SUPPORTED PROJECTS

An account of the progress reports of PSF supported projects, received during the year, 1986-87, is given below:-

A. FINAL REPORTS

During the year under review, 8 final reports were received. Particulars of these schemes and brief summaries of the achievements made in these projects are as under :-

Project No.: S-PCCC/Agr (77)
Project Title: Development of Commercial Hybrid Cotton.

Project Particulars:

- Duration Three years
- Date of commencement 15.5.1983
- Date of completion 8.9.1986
- Location of Scheme Cotton Research Institute, Sakrand, Nawab Shah, Sind.
- Principal Investigator Mohiuddin Ahmad
- Total Expenditure Rs.1,41,188/-

Main Objectives: To boost up cotton production by exploiting the well known phenomenon of heterosis and the Egyptian-American hybrids.

SUMMARY OF THE WORK DONE:

The improvement made in quality and quantity of cotton through conventional breeding is not substantial enough to bring yield levels in Pakistan at par with those of developed countries. Therefore, exploitation of interspecific hybrid vigour for developing commercial hybrid cotton has been resorted to achieve a break through in quality and quantity of cotton.

Under this project fifty hybrids of *G. hirsutum* and *G. herbardense* parents were evaluated against local type-Qalandri. Of these,

thirty one gave significantly better performance as compared to Qalandari. It was observed that those hybrids which had heat resistant/tolerant, *G. hirsutum* as one of the parent, gave best performance against Qalandari as compared to others. A further comparison of these best hybrids among themselves could lead to isolate most suitable combination for production of commercial hybrid cotton through cytoplasmic male sterile system. Accordingly, for selecting best cross combination to develop commercial FI hybrid, the genetic male sterile line (m_5-m_6) was crossed with various *G. barbadense* cultivars and during the season (1985-86) six FI hybrids were raised. None of them gave better performance than Qalandari. This trial would be repeated to confirm the results.

Towards development of commercial FI hybrids through cytoplasmic male sterile system, four *G. hirsutum* cultivars viz., Delta-pine-70, NIAB-78, ST-3 and CRIS-1/80 were crossed on to cytoplasmic male sterile lines to convert them into cytoplasmic male steriles.

Two new fertility restorers (R lines) of *G. hirsutum* group were developed from the cross (JBW 633x2-72)x2-72 and CMS-BW 76-31 x Q type restorer, the former with restorer and fertility enhance genes and the latter with high gossypol content in addition to these two types of genes. To study their efficacy for inducing fertility, these were crossed on to various cytoplasmic male steriles for planting cross seed next year and to evaluate their fertility.

For production of commercial hybrid cotton, available, cytoplasmic male sterile lines were propagated by crossing with sister sib fertility restorer lines by selfing besides maintenance of other promising cultivars of *G. hirsutum* and *G. barbadense*.

On the basis of three years experimentation, following conclusions have been drawn:-

- i) In FI hybrids between *G. barbadense* and *G. hirsutum* cultivars those hybrids which have heat resistant *G. hirsutum* as one of the parents manifest high degree of heterosis in yield in comparison to others.
- ii) The main contributor towards yield in interspecific FI hybrids (*G. hirsutum* *G. barbadense*) is boll number per plant whereas boll weight shows negative heterosis which is over compensated towards yield by high degree of positive heterosis in number of bolls per plant.
- iii) The ginning out-turn, in general, is low in FI hybrids mainly, due to high degree of positive heterosis in seed index and comparatively lesser in lint index.

Project No: S-KU/Bio (51)
Project Title: A survey of Phytoplankton of Sind area and the utilization of fresh-water and marine algae as food for animal/man.

Project Particulars:

- Duration Two-years (1 1/2 year+ 6 months extension)
- Date of commencement: 15.8.1977
- Date of completion 14.2.1979

Extension

- Date of commencement: 15.8.1984
- Date of completion: 14.2.1985
- Location of Scheme: Department of Botany, University of Karachi, Karachi.
- Principal Investigator: Dr. (Mrs.) Phool B. Zahid.
- Total Expenditure: Rs.1,66,196/-

Main Objectives: i) Isolation and preparation of mass cultures of suitable strains of phytoplanktons.
ii) Chemical analysis of pure cultures for their food value.
iii) Feeding experiments of fishes, birds and domestic animals. (Extension period).

SUMMARY OF THE WORK DONE:

Protein is the most important constituent of food which can also be obtained in a sufficient quantity from microscopic green and blue algae, i.e. phytoplanktons. In the aquatic ecosystem, these phytoplanktons form an important link of the food chains as the zooplanktons depend on phytoplanktons for their food requirements which in turn are consumed by fish, birds and other animals. Phytoplanktons are also consumed directly by herbivorous fishes. Hence fish production can be increased if species of phytoplanktons preferred by fishes are known. The

phytoplanktons have also been fed directly to cattle which is the chief source of animal protein.

During this project water samples were collected from Karachi, Hyderabad, Larkana, Sehwan, Dadu, Mirpur Khas, Kotri, Jacobabad, Thatta, Sujawal, Gharo, Tando Ghulamullah, etc., for the investigation of healthy and resistant varieties of micro-algae. Out of these samples, twenty strains of *Chlorella*, *Chlamydomonas*, *Chlorococcum*, *Scenedesmus*, *Spirogyra*, *Nostoc*, *Lynabya*, *Spirulina*, *Monoraphidium Anabaena* and *Glococapsa* have been isolated in uni-algal cultures. *Ulva lecturea*, collected from Karachi coast was kept as control for comparison of protein contents of the micro-algae. Species of *Monoraphidium contrortum*, *Scenedesmus quadricauda*, *S. dimorphus*, *Chlorella vulgaris* and *Spirogyra ellipsozona* were utilized for mass-cultivation experiments.

Artificial cultivation of algae was done in order to produce useful organic material for food and feed as because the rate of growth, protein contents and amino acids seem to be almost ten times greater than the crop plants. On the basis of these experimentation, it was concluded that these autotrophic plants produce a very important potential source of protein rich biomass, and for algal mass-cultivation as in southern parts of Sind, the climate for out-door culture system appears to be most appropriate.

The selected algal species from coccoid green algae like *Chlorella vulgaris*, filamentous green algae *Spirogyra ellipsozona* and thalloid green algae (sea-weed) *Ulva lectuca* have been used as test algae for chick's (broiler) feeding experiments. Attempts were made to formulate a feed ration for poultry birds (broiler) in order to achieve a low cost feed with better potentials. Feeding programme was carried out on one day old chicks to eight weeks old birds. It has been observed that birds which feed on higher percentages of coccoid algae *Chlorella vulgaris* and thalloid algae *Ulva lectuca* showed best results in terms of quantity and quality of meat.

Project No: P-PU/Bio (93)
Project Title: Morphological and metabolic hazards of chlorinated insecticides on small mammals in Pakistan.

Project Particulars:

- Duration Three years
- Date of commencement: 1.8.1980
- Date of completion: 30.11.1983

- Location of Scheme: University of the Punjab, Lahore.
- Principal Investigator: Dr. Abdul Rauf Shakoori.
- Total Expenditure: Rs.2,51,636/-

Main Objectives: To study the effects of pollution due to chlorinated insecticides on animals with extrapolation of results to human beings.

SUMMARY OF THE WORK DONE:

The organo-chlorinated insecticides, continue to remain a topic of lively debate in the recent years because of their toxic effects on non-target organisms. In spite of posing restriction for their common and open use, they are still being manufactured and extensively used in various countries of the world. It has been proved on several occasions that these insecticides are hazardous to living systems as they are likely to gain entry into the food chain directly or indirectly. These are highly persistent chemicals in our environment. Frequent residue analyses have shown high rate of accumulation of these insecticides in animal systems including human tissues.

The present research project was aimed at assessing the visible and invisible damage done to non-target organisms by chlorinated insecticides. In this regard, effects of these environmental pollutants were studied on haematology, blood bio-chemistry, liver biochemistry and liver histopathology.

Albino male rats (Sprague Dawley) were fed on sublethal doses of chlorinated insecticides (aldrin, dieldrin, gamma-BHC and DDT) for different time periods viz (i) 24 to 48 hours, (ii) 3 days to 15 days, and from 6 months to 18 months. At the end of each stipulated period, blood samples were collected and livers were taken out. The blood was then processed for haematological and biochemical studies while the livers were used for histological and biochemical analyses.

The orally administered insecticides caused drastic haematological and biochemical changes in the blood serum. The haemoglobin content, RBC count and packed cell volume decreased, while the WBC count increased under all experimental conditions. The biochemical analysis of blood serum with special references to liver function tests also revealed acute toxic effects of these insecticides. Various biochemical parameters viz. activities of several enzymes like, ATP, ACP, SGOT, LDH, ICDH, CPK, cholinesterase, amylase etc. were significantly raised, suggesting cellular damage and physiological abnormalities. The changes were very prominent in acute dose i.e. short term experiment, while in long term experiment animals showed signs of slight

recovery which indicates some kind of adjustment with the induction of body's own defence mechanisms.

The changes corresponding to blood were also found in the liver. Liver, in fact is the main target of these foreign compounds, which alter its structure and function severely. Various abnormalities in biochemical milieu are in fact the reflection of toxic abuse of the liver.

The chlorinated insecticides under all experimental conditions lead to hypertrophy of hepatic cells, its nuclei and nucleoli. They also produce necrosis, results in fat deposition, and cause dialation of sinusoidal areas. All these structural abnormalities in liver are also manifested in terms of metabolic disturbances and hepatic dysfunction. There are reports regarding the accumulation of these insecticides in the living systems especially in fatty tissues, liver and muscles, where they produce long term effects and carcinogenic changes. The chlorinated insecticides inflict some serious metabolic and morphological disorders, which at certain doses are irreversible because of the non biodegradability of most of these toxic chemicals. The results reported here pertain specifically to albino rats, but they can be extrapolated to other mammals including man.

The insecticides, no doubt, are unavoidable for pest control but keeping in view their potential toxicity and hazards to living systems, as revealed by this study, insecticides, especially the chlorinated ones must be used in the human environment with utmost care because once these chemicals gain entry in the human food chain, it is very difficult to get rid of their residues and harmful effects.

In view of the above findings the investigators have suggested that country wide surve of these chlorinated insecticides should be conducted to monitor the residue levels in the human food chain and other facets of the environment, and if their residues are found to exceed the acceptable daily intake (ADI) level, their use should be restricted.

Project No:	S-KU/Bio (116)
Project Title:	Chemotaxonomic studies in angiosperms from Pakistan with reference to Phenolics.
Project Particulars:	
- Duration	Three years
- Date of commencement	1.8.1983
- Date of completion	31.7.1986

- Location of scheme: Department of Botany, University of Karachi, Karachi.
 - Principal Investigator: Dr. Khadija Aziz.
 - Total Expenditure: Rs.2,49,023/-
- Main Objectives:
- i) To differentiate species on the basis of species-specific phenols.
 - ii) To provide a broad phenolic spectrum to be used in several applied and pure sciences for different purposes.
 - iii) To study the use of phenolics for plants systematics and to provide species differentiation for future use of plants in Pakistan.

SUMMARY OF THE WORK DONE:

Phytochemistry, particularly phenolics are important as taxonomic markers because of their variability, wide distribution, stability, ease of detection and relatively known inheritance. These compounds have direct multipurpose functional roles such as improving plants of horticulture and pharmaceutical interest, fodder plants, fruit processing and other industries. Agricultural crops are improved by introducing disease resistant varieties which are associated with high level of phenolic compounds. Species specific phenolics would provide a good basis to be used for plant systematics.

The phenolics' constituents in the members of the sub-families Mimosoideae and Caesalpinioideae Family (Leguminosae) from Pakistan have been investigated. The sub-family Mimosoideae consists of 11 genera and 56 species and Caesalpinioideae includes 15 genera and 33 species, out of which a total of 17 genera with 37 species have been investigated for phenolics. Further more two genera with two species of the sub-family papilionoideae were also investigated.

At present 39 species of the genera *Acacia*, *Adenanthera*, *Albizia*, *Leucaena*, *Mimosa*, *Pithecellobium*, *Prosopis*, *Samanea*, *Bauhinia*, *Caesalpinia*, *Cassia*, *Ceratonia*, *Delonix*, *Hardwickia*, *Parkinsonia*, *Peltophorum*, *Tamarindus* *Indigofera* and *Vicia* have been assayed on the basis of one and two dimensional paper and thin layer chromatographic techniques.

A total of about 63 phenolics were tentatively identified by using authentic markers, R_f values comparable to literature values, color reactions with spray reagents and UV-fluorescence. Ultraviolet spectral data of Caffeic acid, Quercetin and Myricetin were obtained in *Tamarindus indica*.

Plants were analysed for inter-plant and inter locality chemical differences and relationships etc. which has revealed the geographical, environmental and ecological stability of these compounds, clearly indicating that this approach is significant particularly for taxonomic judgements.

Project No:	C-QU/Chem (137)
Project Title:	Polymerization and electron transfer process studies on substituted ethylenes.
Project Particulars:	
- Duration	Three years
- Date of commencement:	April, 1983
- Date of Completion:	31.3.1986
- Location of Scheme:	Department of Chemistry, Quaid-i-Azam University, Islamabad.
- Principal Investigator	Dr. Mahboob Mohammad
- Total Expenditure:	Rs.57,590/-
Main Objectives:	To study the phenomenon of Polymerization, particularly ionic polymerization with the understanding of solution chemistry and electron transfer process which include ionpairing, homogeneous and heterogeneous electron transfer, solvation free-energies etc.

SUMMARY OF THE WORK DONE:

Polymers are of innumerable types and their uses are enormous. In Pakistan, generally, those polymeric materials which are getting out-dated in the western countries, are being manufactured, whereas, the better quality polymers are being imported. This is mainly due to the reason that little research is being carried out on polymers. The phenomenon of polymerizat-

ion particularly ionic polymerization can be understood (and hence controlled) with the understanding of solution chemistry and electron transfer process which include ion pairing, homogenous and heterogenous electron transfer (i.e. single step and multistep electron transfer), solvation free energies etc.

The Lithium, Sodium, Potassium, Rubidium and Tetrabutylammonium salts of Tetraphenylethylene were prepared and their optical spectra recorded and resolved. The resolved spectra indicate three absorption bands helping in elucidating the structure of the salt. An attempt to make magnesium salt was partly successful, in the sense that, most probably, a monoanion radical is formed.

Computer programmes in BASIC language were developed for SCFMO calculations. Computer programs in BASIC were written and developed for Huckel, W-technique and perturbation methods. These methods were developed for the calculation of "Inner" Organization energy for heterogeneous electron transfer rate constant.

The theoretical aspect of calculating the reversible (formal) electrode potential E^0 for irreversible (electron transfer) process through the calculation of the heterogenous rate constants was worked out. Calculations were carried out on outer and inner re-organization energies, free energies of activation and the heterogeneous electron transfer rate constants. Free energies of activation thus calculated were compared with the experimental value.

Voltammetric studies were carried out on the tetraphenyl ethylene in DMF; DMF-Benzene mixture and HMPA. The hitherto unknown disproportionation constant ($2T^- \rightleftharpoons T^{2-} + T$) and the dissociation constants ($T^{2-}, M^+ \rightleftharpoons T^-, M^+$) were calculated.

As an attempt to fabricate an assembly for rotating disc electrode polarography, a manual polarograph was fabricated and tested. It was found to work satisfactorily. The main feature of this polarograph is that it is inexpensive (price approximate costs US \$ 100), portable and light (weight Approx. 2-Kg).

Project No: S-CSIR/Chem (143)

Project Title: Development of new Inorganic materials based on portland cement.

Project Particulars:

- Duration Three years

- Date of Commencement: 1.2.1984

- Date of completion 31.1.1987
- Location of scheme: PCSIR Labs., Karachi.
- Principal Investigator Mr. Mohammad Aslam.
- Total Expenditure Rs.2,10,687/-

Main Objectives: To develop new inorganic materials of general utility based on portland cement which are referred to as inorganic plastics of the future.

SUMMARY OF THE WORK DONE:

Portland cement has been extensively used for over a century in construction work and civil engineering to bind together aggregates such as sand and crushed stone. However, it is brittle with low tensile strength and can be used in load carrying structure only after re-inforcement with fibre or steel.

The project was aimed at developing new inorganic materials of general utility based on Portland Cement which are not dependent on hydration feedstock and require less energy for their production.

Two compositions of super-plasticizers, one based on stabilised sodium resinate and the other on waste sulphite liquor, which give optimum performances and are commercially exploitable, were systematically evaluated and the following conclusions have been made:-

- i) Super-plasticizers can be converted into a dry powder through a simple technology of adsorbing the liquid composition on the amorphous silica. Properties of the dry powder and their influence on cement and concrete have been studied. On account of the very active nature of silica, the dry powder provides additional advantages to the concrete.
- ii) High strength materials can be prepared by simultaneous application of high pressures and temperature. However, the time cycle, which is of the order of about 60 minutes would be a hinderance for its commercial exploitation.

Financial savings as a results of 15 and 20 percent cement replacement have also been worked out. The saving is attractive,

when looked from the point of concrete costs but when considered from the point of view of total cost of building a house, saving looks rather modest from Rs.1.5 to 6.5 per ft²). However overall advantage from the national point of view in respect of reduced cement consumption cannot be ignored.

Preliminary feasibility study for the manufacture of the patented super-plasticizer (melamine-Sugar Formaldehyde sulphonate) has been completed. Manufacture would be a viable proposition when the demand reaches the level of 200,000 lbs.

LIST OF PUBLICATIONS, PATENTS ETC.:

- An improved Super-plasticizer for producing highly workable concretes. Pakistan Patent Appl. 288/86 (6.7.1986).
- Development of improved stabilized sodium resinate & waste Sulphite liquor based plasticizer compositions for application in concrete technology. Proc. Pak. Acad. Sci. 1987, 24, No. 1, 49-64.
- Studies on the preparation of super-plasticizers and their effect on the properties of cement and concrete. Accepted for publication in Proc. Pak. Academy of Sciences.

Project No:	C-QU/Chem (151)
Project Title:	Development of amino acid ester hydrobromide salts as antimicrobial, antimothe and antickroach agents.
Project Particulars:	
- Duration	One Year.
- Date of commencement:	14.7.1985
- Date of completion	13.7.1986
- Location of Scheme:	Department of Chemistry, Quaid-i-Azam University, Islamabad.
- Principal Investigator	Dr. Zubair Ahmad Malik.
- Total Expenditure:	Rs.78,200/-

Main Objectives:

- To synthesise water soluble amino acid ester hydrobromide salts.
- To study antimicrobial activity of the synthesised salts on some pathogenic microorganisms for developing non-antibiotic drugs, and
- To study moth and cockroach repellent activity of the synthesised compounds.

SUMMARY OF THE WORK DONE:

Hydrophobic amino acid ester hydrobromide salts were prepared by using pure and dry methanol, ethanol, propanol, 2-chloroethanol, s-butanol or tert-butanol and glycine, alanine, valine, leucine, aspartic acid, glutamic acid or lysine by using pure dry HBr gas. 49 compounds were synthesised and tested for their physiological, antimicrobial and insect repellent activities.

The results indicate that the ester hydrobromide salts of the amino acids are stable in light and air at room temperature. In air, they absorb moisture quickly, hence they should be used immediately after synthesis otherwise they must be kept in air-tight bottles. The esters are easy to handle and their solutions in water remain stable for at least 24 hours. Most of the compounds are insect repellent and record antimicrobial activity against Gram-positive and Gram-negative microbes. All the test results are reproducible. Some of the esters have shown specific activity against particular bacteria hence they can be considered for use as specific non-antibiotic compounds with negligible toxicity for a short period with no harmful effects after further pharmacological screening. 2-Chloroethyl, ethyl-methyl and propyl esters of amino acids are active against most of the microbes as compared to the standard antibiotics which do not show such a variety of anti-bacterial activity. Antimoth activity of Methyl L-leucinate (10% solution) has been studied at various stages of the moth life. Initial results have indicated that the compound is highly toxic to larvae and they were killed instantly. Dilute spray had made them lethargic, hindered their normal activity and moths were dead on third day. These experiments were run on several larvae and were reproducible.

The results further indicate that all the esters obtained have same L-configuration as their parent amino acid except that angle of rotation has decreased due to the salt formation. This effect is important as it will show its impact while conducting various kinds of screening either on the microbes or on the

insects. It is well known that most biologically active compounds retain L-configuration and record positive angle of rotation.

Project No:	P-PU/Maths (8)
Project Title:	Inclusive reactions.
Project Particulars:	
- Duration	Three years
- Date of commencement	1.8.1976
- Date of completion	31.7.1979
- Location of scheme:	Department of Physics, University of Punjab, Lahore.
- Principal Investigator	Dr. M. Saleem
- Total Expenditure	Rs.48,101/-
Main Objectives:	To suggest a new model consistent with new data for explaining SPRAR measurement by no quark Model.

SUMMARY OF THE WORK DONE:

The study was aimed at (i) investigating the mathematical models developed so far, (ii) predicting the behaviour of fundamental particles and (iii) suggesting a new model while taking into account the deficiencies and shortcomings of the existing models.

Theoretical models as well as experimental techniques for inclusive reactions were studied. The special emphasis was on the reaction $p+p \rightarrow p+x$ and $p+d \rightarrow d+x$. The dynamics underlying inclusive reaction as well as the experimental techniques were also studied. Single particle distribution is a function of 3 variables, say s, q, r . The variation of distribution with s was analysed. The variation of distribution with q and r for fixed s was also studied. In order to consider fundamental questions which might be relevant to the overall picture of the new, high energy results, the following points were noted:-

- a) The s -dependence of the diffractive component in exclusive reactions in particular, the energy dependence of the production cross section

for isobar states.

- b) The mass dependence of the inclusive diffractive cross-section for large or reduced masses.
- c) The resonance composition of final states. In particular, do invariate mass distributions reach a limiting behaviour with increasing mass as inclusive spectra in the fragmentation region do?
- d) The slope-mass correlation and shrinking phenomena as possible universal properties of diffraction.
- e) The relevance of impact parameter models in describing structures in the differential cross-sections and the mass dependence of the helicity flip amplitudes.
- f) The dynamical connections between single and double diffraction. In particular, is factorization adequate to describe also the behaviour of differential cross-section?

On the basis of work done during this project some theoretical models for inclusive reactions have been proposed.

(B) SECOND ANNUAL REPORTS:

The second annual reports of the following projects were received and processed by the Foundation during the period under report:-

<u>Project No:</u>	<u>Project Title:</u>
S-AU/Agr (80)	Quality improvement in vegetables.
P-PU/Agr (86)	Studies on phenology, germination ecology and control of some important weeds of wheat.
P-PU/Bio (117)	Biology of <i>Billamaya bengaliensis</i> (Lamarck) with special reference to its reaction to other molluscs and digenetic trematode parasites.
S-SU/Chem (133)	Preparation and development of new sensitive chromogenic reagents for the analysis of metal ions.

P-CSIR/Eng (20)	Development of fluidized bed coal combustion system based on low grade coal for the supply of clean heat for industrial use.
C-QU/Phy (36)	Some aspects of thermo-nuclear fusion.
C-QU/Phy (44)	Deep level transient spectroscopy on semi-conductor materials.

(C) 1ST ANNUAL REPORT:

The 1st annual reports of the following projects were received and processed during the period under report:-

<u>Project No:</u>	<u>Project Title:</u>
P-PU/Agr (81)	Effects of Aflatoxins in Poultry.
P-VC/Agr (85)	Study of Epidemiology of human and animal origin in Punjab.
S-KU/Agr (88)	Studies on culturing of <i>Meloidogyne incognita</i> and <i>Heterodera zae</i> on excised roots of tomato and corn.
P-PU/Bio (121)	Effects of heavy metals, with special reference to cadmium and lead on common edible fish of Pakistan.
S-KU/Bio (132)	Extrachromosomal elements for invivo genetic engineering.
T-TICR/Bio (145)	Collection and record of reptilian fauna of tableland Potwar, Punjab, Pakistan.
S-CSIR/Chem (150)	Studies on the hypocholestoremic effect of <i>Allium sativum</i> Linn and scientific investigation of its protective action against the coronary heart disease.
P-CSIR/Chem (151)	Study of the essential oils of the species of the plant family Umbelliferae of Pakistan.
F-PU/Chem (153)	A Thermodynamic study of the Super-molecular Order in Aqueous Solution of Polyvinyl Alcohol.

S-KU/Chem (165)	Isolation and Structural studies on the Chemical constituents of <i>Ervatamia coronaria</i> .
S-KU/Chem(170)	Studies on the Chemical constituents of Capparidaceous Plants of Pakistan.
F-CSIR/Envr (28)	Track filter systems, development and their applications in biological and environmental sciences.
S-JPMC/Med (44)	Investigation on therapeutic value of indigenous plants used in Traditional medicines for the control of diabetes.
C-CGP/Med (92)	Incidence of infertility in Islamabad and management of primary and secondary infertility by advanced techniques.
S-DMC/Med (103)	Early detection of Carcinoma Cervix using Colpomicroscope and comparing with other methods.
S-AKMC/Med (105)	General anesthetic respiratory function of gama amino butyric acid (GABA) levels in rat brain.
C-NIH/Med (110)	Mother-infant transmission of Hepatitis B Virus in Pakistan.
S-KU/Phys (41)	Measurement of electrical conductivity of some solids at and below room temperature.
C-QU/Phys (49)	Coherence properties of radiation in non-linear optics and lasers.

CHAPTER - 3

ORGANIZATION AND ADMINISTRATION

The organizational structure of the Pakistan Science Foundation, Pakistan Scientific & Technological Information Centre and Pakistan Museum of Natural History are given on page -

The staff position in the Foundtion, PASTIC & PMNH during the period is as under:-

PAKISTAN SCIENCE FOUNDATION

S.No.	DESIGNATION	NUMBER
1.	Chairman	1
2.	Member Science	1
3.	Member Finance	1
4.	Secretary	1
5.	Principal Scientific Officer	2
6.	Senior Scientific Officer	3
7.	Science Promotion Officer	1
8.	Deputy Secretary	1
9.	Deputy Director (F&A)	1
10.	Administrative Officer	1
11.	Accounts Officer	1
12.	PS to Chairman	1
13.	Librarian	1
14.	Internal Audit Officer	1
15.	Scientific Officer	5
16.	Assistant Scientific Officer	1
17.	Accountant	1
18.	Caravan Incharge	1
19.	Graphic Artist	1
20.	PA to Chairman	1
21.	Supporting staff	66

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In addition to the whole-time Staff Members of the Foundation there are about 200 scientists and technologists in various universities and research organizations who are acting in an honorary capacity as reviewers of the research proposals and members of the Technical Committees or Principal Investigator of PSF Supported Projects.

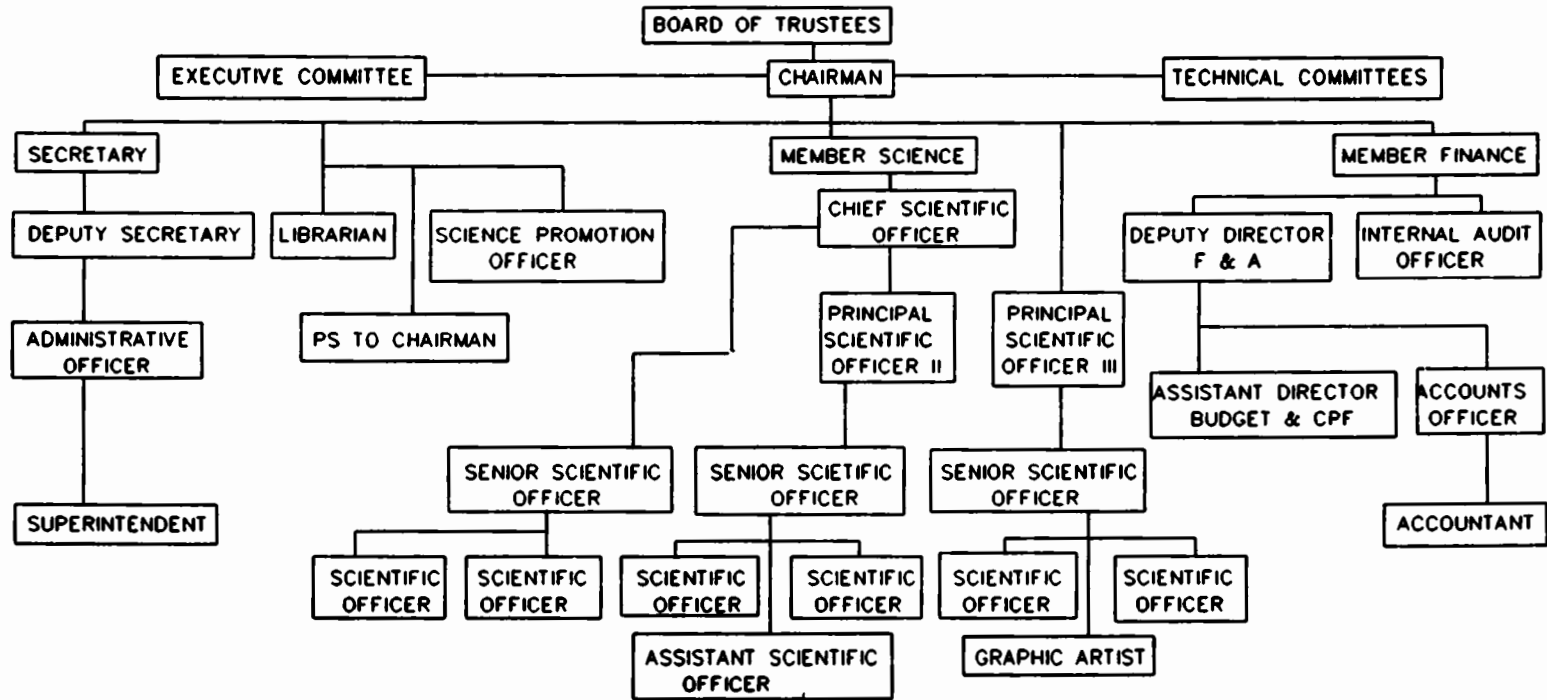
**PAKISTAN SCIENTIFIC & TECHNOLOGICAL INFORMATION
CENTRE**

S.No.	Designation	Number
1.	Director	1
2.	Principal Documentation Officer	1
3.	Senior Librarian	1
4.	Senior Information Officer	1
5.	Officer-in-Charge (Karachi)	1
6.	Accounts Officer	1
7.	Indexer	1
8.	Documentation Officer	1
9.	Statistical Officer	1
10.	Abstractor	1
11.	System Analyst	2
12.	Patent Officer	1
13.	Printing Officer	1
14.	Photographic Officer	1
15.	Officer-in-Charge(Quetta-Peshawar)	2
16.	PA to D.G.	1
17.	Superintendent (Admn.)	1
18.	Assistant Accounts Officer	1
19.	Accountant	1
20.	Cataloguer/Classifier	1
21.	Assistant Programmer	1
22.	Senior Plate Maker	1
23.	Superintendent (Documentation)	1
24.	Superintendent	1
25.	Assistant Documentation Officer	1
26.	Supporting Staff	77
		<u>104</u>

**PAKISTAN MUSEUM OF NATURAL HISTORY ISLAMABAD
P M N H**

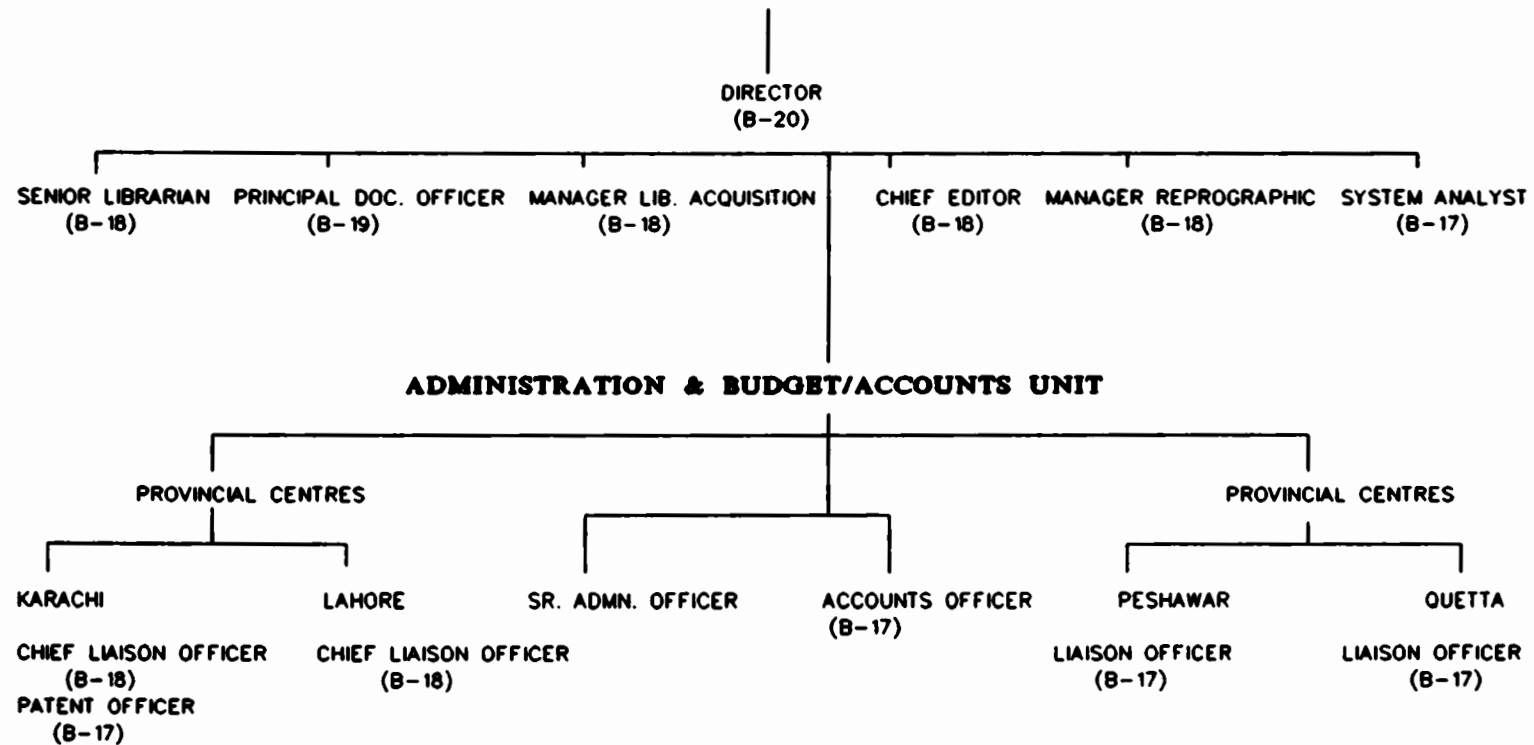
S.No.	Designation	Number
1.	Director General	1
2.	Directors	2
3.	Curators	2
4.	Associate Curators	6
5.	Research Associates	22
6.	Product Designer	1
7.	Artist	1
8.	Administrative Officer	1
9.	Accounts Officer	1
10.	Librarian	1
11.	Taxidermists	2
12.	Teacher Guide	1
13.	Superintendent	1
14.	Accountant	1
15.	Supporting staff	75
		<u>118</u>

**PAKISTAN SCIENCE FOUNDATION
ORGANIZATIONAL CHART**



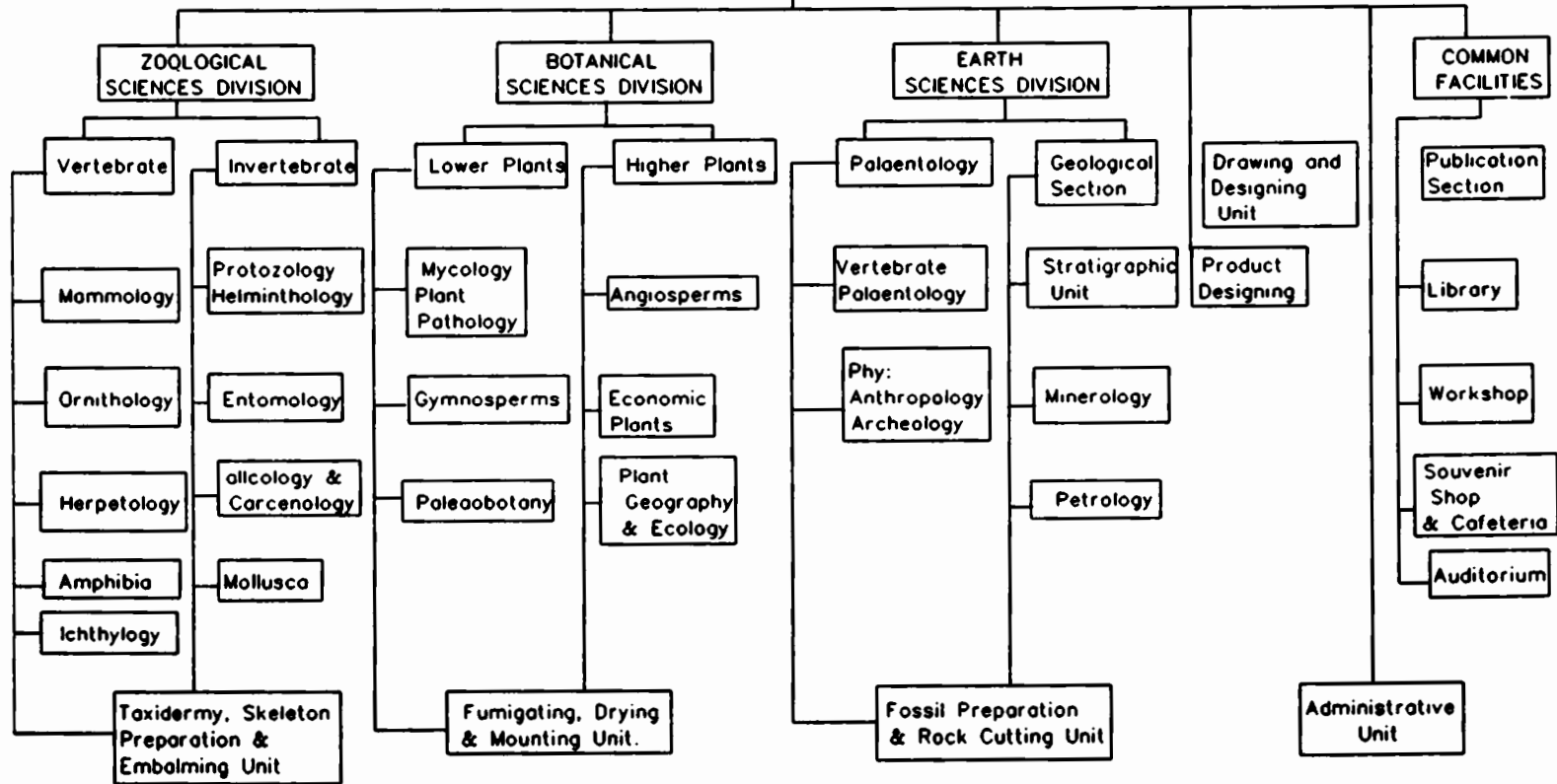
ORGANIZATION CHART

**PAKISTAN SCIENCE FOUNDATION
PAKISTAN SCIENTIFIC & TECHNOLOGICAL INFORMATION CENTRE
(PASTIC)
ISLAMABAD**



ORGANIZATIONAL STRUCTURE

PAKISTAN MUSEUM OF NATURAL HISTORY



CHAPTER - 4
AUDITORS REPORT

The reports of the Auditors appointed by the Foundation in consultations with the Auditor General of Pakistan are reproduced with respect to Pakistan Science Foundation, and its attached departments, Pakistan Scientific & Technological Information Centre and Pakistan Museum of Natural History.

The names and addresses of the Auditors are :-

Pakistan Science Foundation	Nazir Chaudhri & Co., Chartered Accountants, 2-Gardee Trust Building, Napier Road, <u>Lahore-7</u>
Pakistan Scientific & Technological Information Centre	Akbar & Company, Chartered Accountants, Amin Building, Shahrah-e-Quaid-i-Azam <u>Lahore</u>
Pakistan Museum of Natural History	Ilyas Saleem & Co., Chartered Accountants, 18-D, 6th Road, Satellite Town, <u>Rawalpindi.</u>

65793
Phone: 68304
56560

N A Z I R · C H A U D H R I & C O.
CHARTERED ACCOUNTANTS
2 - GARDEE TRUST BUILDING NAPIER ROAD
LAHORE - 7

AUDITORS REPORT

We have examined the annexed Balance Sheet of Pakistan Science Foundation as at 30th June, 1987 and the annexed Receipts and expenditure account for the year ended 30th June, 1987 and report that :-

- (a) We have obtained all the information and explanations we required;
- (b) Such Balance Sheet exhibits a true and correct view of the state of the Foundation's affairs according to the best of our information and explanations given to us and as shown by the books of the Foundation;
- (c) The receipts of the Foundation during the year ended 30th June, 1987, comprise of grants received from the Federal Government. We are satisfied that the grant so received has been utilized for the objects for which it was made within the specified time limit and that there was no unspent balance except for expenses incurred but not paid upto June 30, 1987. However, refunds amounting to Rs.159,899/- the accumulated balance thereof (Note '6' of the account), were not surrendered to the Federal Government upto the Balance sheet date. We are also satisfied ourselves about the propriety of the disbursements made from the grant.

Sd/-

NAZIR CHAUDHRI & CO.
Chartered Accountants

LAHORE.

DATED:

PAKISTAN SCIENCE FOUNDATION, ISLAMABAD

BALANCE SHEET AS AT 30TH JUNE, 1987

<u>FUNDS AND LIABILITIES:</u>	<u>NOTE</u>	<u>1987</u>	<u>1986</u>	<u>PROPERTY AND ASSETS</u>	<u>NOTE</u>	<u>1987</u>	<u>1986</u>
<u>GENERAL FUND</u>	2	6,612,292	6,119,235	<u>FIXED ASSETS</u>			
<u>RESEARCH SUPPORT GRANT</u>	3	51,798,586	46,799,823	(As per Schedule Annexed)		5,834,591	4,715,918
<u>CURRENT LIABILITIES</u>	4			RESEARCH PROJECTS IN PROGRESS	6	51,798,586	46,799,823
For Expenses		101,501	120,746	<u>CURRENT ASSETS</u>			
Grant Refundable to Government	5	159,899 261,400	159,899 280,645	Accounts Receivable	7	50,000	162,000
				Advances, Deposits & Prepayments.	8	955,684	1,298,220
				Cash & Bank Balances.	9	33,417	223,742
						<u>1,039,101</u>	<u>1,683,962</u>
		----- 58,672,278 ----- =====	----- 53,199,703 ----- =====			----- 58,672,278 ----- =====	----- 53,199,703 ----- =====

CHAIRMAN

TRUSTEE

TRUSTEE

The above Balance Sheet should be read in conjunction
with the annexed notes and accounts.

Sd/- NAZIR CHAUDHRI & CO.
CHARTERED ACCOUNTANTS

PAKISTAN SCIENCE FOUNDATION, ISLAMABAD

RECEIPTS AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 30TH JUNE, 1987

<u>EXPENDITURE</u>	<u>NOTE</u>	<u>1987</u>	<u>1986</u>
Grants	10	6,385,441	6,611,408
Development Grant	11	3,083,524	3,549,000
Travel Grant for Scientific Surveys	12	452,103	528,427
Science Conferences Seminars & Scientists Pool	13	-	12,167
Other Functions	14	765,665	738,413
Administrative Expenses	15	5,147,597	4,002,578
		<u>15,834,330</u>	<u>15,441,993</u>
		=====	=====
 <u>INCOME</u>			
Miscellaneous	16	1,863	4,630
Net expenditure for the year transferred to General Fund.		<u>15,832,467</u>	<u>15,437,363</u>
		=====	=====

NOTE: These above Receipts and Expenditure Account should be read in conjunction with the annexed notes.

CHAIRMAN

TRUSTEE

TRUSTEE

Sd/- NAZIR CHAUDHRI & CO.
Chartered Accountants

PAKISTAN SCIENCE FOUNDATION, ISLAMABAD

SCHEDULE FOR FIXED CAPITAL EXPENDITURE AS AT JUNE 30, 1987

PARTICULARS	C O S T			As on 30.6.1987	RATE	D E P R E C I A T I O N				
	As on 1.7.1986	Addition	Adjustment			As on 1.7.1986	Adjust- ment	For the year	As on 30.6.1987	W.D.V. as on 30.6.1987
Lease Hold Land.	3013,919.00	-	-	3013,919.00	-	-	-	-	-	3013,919.00
Furniture & Fixture	518,706.79	83,876.00	-	602,582.79	6%	155,019.29	-	26,583.81	181,873.00	420,709.69
Office Equipment	741,412.00	23,569.05	-	764,981.05	15%	327,491.71	-	65,623.40	393,115.11	371,865.94
Air-conditioners	118,364.00	60,610.00	-	178,974.00	15%	86,170.85	-	13,920.47	100,091.32	78,882.68
Motor Vehicles	1166,730.88	609,856.94	-	1776,587.82	20%	499,605.54	-	255,396.45	755,001.99	10,21,585.83
Science Equipment	189,850.13	779,983.12	-	969,833.25	15%	52,683.41	-	137,572.48	190,255.89	779,577.36
Library Books & Films	103,857.76	67,958.68	-	171,816.44	5%	16,094.03	-	7,786.12	23,880.15	147,936.29
Bicycle	680.00	-	-	680.00	20%	537.28	-	28.54	565.82	114.18
1987	5853,520.56	1625,853.79	-	7479,374.35		1137,602.11	-	507,181.27	1644,783.38	5834,590.97
1986	5044,854.77	808,665.79		5853,520.56		840,020.05		297,582.06	1137,602.11	4715,918.45

PAKISTAN SCIENCE FOUNDATION
ISLAMABAD

NOTES ON ACCOUNTS 30TH JUNE, 1987

1. ACCOUNTING POLICIES

The principal accounting policies which have been adopted in the preparation of the Foundation's accounts are as follows:-

GRANT RECEIVED

1.1 Grant from the Government of Pakistan has been accounted for on receipt basis.

RESEARCH SUPPORT GRANT

1.2 Research support grant has been accounted for on payment basis.

FIXED ASSETS

1.3 Fixed assets have been valued at cost less accumulated depreciation except lease-hold land which is valued at cost.

1.4 Depreciation on Fixed assets has been charged on reducing balance method.

2. GENERAL FUND

Movement in the Account during this year is as follows:-	<u>1987</u>	<u>1986</u>
Balance as at 1st July, 1986	6,119,235	5,574,540
Grant received from Government of Pakistan during the year:-		
Non-Development grant	13,404,000	12,500,000
Development grant.	<u>3,083,524</u>	<u>3,549,000</u>
	22,606,759	21,623,540
Less: Expenditure during the year	<u>15,832,467</u>	<u>15,437,363</u>
	6,774,292	6,186,177
Less prior year adjustment (Note)	<u>.162,000</u>	<u>-</u>
	6,612,292	6,186,177

NAZIR CHAUDHRI & CO.,
Chartered Accountants

6,612,292 6,186,177

LESS: Refund of un-utilised grant
disbursed during the year shown
under grant refundable to the
Government (Note-5)

- 66,942

6,612,292 6,119,235
=====

3. RESEARCH SUPPORT GRANT

In accordance with the principle out lined in the charter grants aggregating Rs.4,998,763/- have been paid by the Foundation during the year for conducting of various approved scientific research projects as detailed below:-

Medical Sciences	612,245
Chemical Sciences	1,887,967
Agricultural Sciences	339,392
Biological Sciences	1,147,137
Earth Sciences	218,677
Environmental Sciences	64,465
Engineering Sciences	1,121,402
Physical Sciences	276,082
Institutional Support	317,096
Honraria	<u>14,300</u>
Rupees	<u>4,998,763</u>
	=====

This balance arrives at as follows:-

Balance as at 1st July, 1986: 46,799,823

Disbursed during the year 4,998,763

Rupees 51,798,586

- 3.1 In accordance with the provision of the agreement the grantee has undertaken to incur the grant for the performance and execution of Research Projects for which the grant has been sanctioned accordingly. These grants are being carried forward in the accounts of the Foundation and have not been adjusted for completed projects.

4. <u>CURRENT LIABILITIES.</u>	<u>1987</u>	<u>1986</u>
Audit Fee	63,000	75,500
Other Accrued Expenses	<u>38,501</u>	<u>45,246</u>
Rupees	<u>101,501</u>	<u>120,746</u>
	=====	=====

6. GRANT REFUNDABLE TO GOVERNMENT

Balance brought forward	159,899	92,957
Unspent balances relating to grant disbursed;		
During the year	-	66,942
For prior years	153,590	531,320
	Rupees	<u>313,489</u>
Less: grant refunded to the Govt. during the year	153,590	531,320
	Rupees	<u>159,899</u>

6. RESEARCH PROJECTS IN PROGRESS

This represents the expenditure incurred on various research projects which appears per contra on the liabilities side under the Head "Research Support Grant."

7. ACCOUNTS RECEIVABLE COMPRISING.

		<u>1987</u>	<u>1986</u>
PASTIC		162,000	162,000
UNESCO COUPONS		<u>50,000</u>	-
	Rupees	212,000	162,000
Less Prior year adjustment		162,000	-
Note: It was wrongly debited to PASTIC instead of pre-paid rent.		<u>50,000</u>	<u>162,000</u>

8. ADANCES DEPOSITS & PREPAYMENTS

Advances to staff	72,576	105,022
Deposits	5,500	5,500
Prepayments	877,608	987,468
L/C. Margin	-	200,230
	Rupees.	<u>955,684</u>
		<u>1,298,220</u>

9. CASH AND BANK BALANCES

In hand	18,985	15,742
UNESCO COUPONS	<u>14,432</u>	<u>208,000</u>
	Rupees	33,417
		<u>223,742</u>

10.	<u>GRANTS</u>		
	Research Support	4,998,763	5,107,097
	Scientific Societies & Prof; bodies.	815,000	915,000
	Science Conferences, Meetings and Seminars	571,678	589,311
		Rupees. <u>6,385,441</u>	<u>6,611,408</u>
		=====	=====

11. DEVELOPMENT GRANTS.

This represents the grant in Aid received from National Science Foundation of United States of America Project PL-480 through Government of Pakistan has been paid to the following:-

University of Peshawar	196,000	2,475,000
University of Punjab	350,000	505,000
University of Karachi	450,000	569,000
Agricultural University, Faisalabad	1,376,000	-
Foreign Educational Grant	711,524	-
	Rupees. <u>3,083,524</u>	<u>3,549,000</u>
	=====	=====

12. TRAVEL GRANT FOR SCIENTIFIC SURVEY.

<u>SCIENCE CONFERENCES & SEMINARS</u>	<u>1987</u>	<u>1986</u>
Local	Rupees. 452,103	528,428

13. SCIENTIFIC POOL

Salary	-	11,667
Honorarium	-	500
	Rupees. <u>-</u>	<u>12,167</u>
	=====	=====

14.	<u>OTHER FUNCTIONS.</u>	<u>1987</u>	<u>1986</u>
	Science Centres & Herbaria	495,243	317,847
	Information & Documentation	98,968	-
	Awards, Prizes & Fellowships	19,000	52,852
	International Liaison	8,500	254,996
	Collection of Statistics	143,954	111,718
	Utilization of Research Results	-	1,000
	Rs.	<u>765,665</u>	<u>738,413</u>
		=====	=====

15.	<u>ADMINISTRATIVE EXPENSES</u>		
	Salary & other benefits.	2,895,890	2,366,822
	Travelling Expenses (Local)	155,147	98,384
	Office Rent	617,233	474,433
	Electricity Gas & Water	75,320	50,140
	Postage, Telegram & Telephone	316,753	220,534
	Printing & Stationary	74,485	63,499
	Vehicle Running & Maintenance	187,388	210,669
	Newspaper & Periodicals	17,927	11,379
	Liveries & Uniforms	9,980	784
	Entertainment	84,551	30,915
	Repair & Maintenance	22,906	39,575
	Misc. Expenses	23,775	10,221
	Audit Fee	12,500	15,000
	Advertisement	9,377	8,015
	Bank charges	3,650	3,863
	Experts & Consultants	133,534	100,763
	Depreciation	507,181	297,582
		<u>5,147,597</u>	<u>4,002,578</u>
		=====	=====

16.	<u>MISCELLANEOUS INCOME.</u>		
	Interest on advances	1,863	4,630
		=====	=====

17. FIGURES

In these accounts have been rounded off to the nearest rupee.

AKBAR & COMPANY
CHARTERED ACCOUNTANTS

MUHAMMAD AKBAR
B.Com (Hons.) F.C.A.

The Chairman,
Pakistan Science Foundation,
P-13, Al-Markaz, F-7/2,
Islamabad

Subject:- AUDIT OF BOOKS OF ACCOUNTS OF PAKISTAN
SCIENTIFIC AND TECHNOLOGICAL INFORMATION
CENTRE FOR THE YEAR ENDED JUNE 30, 1987.

Sir,

As per telephonic conversation by the Director Miss Azra Sultana we deputed our staff to verify the short comings/observations pointed out in the previous report and we detail that the following information/short comings in our report have been clarified as under:-

(i) ISLAMABAD CENTRE:

1. GRANTS:

This represents the amount received by the Centre from Accountant General Pakistan Revenues. Amounts allocated and remitted to Sub-Centres are as under :-

Name of Centre	Fund Allocated	Funds utilized Remitted.
Islamabad	3,373,888	3,319,792.46
Karachi	536,743	590,538.54
Lahore	246,058	246,058.00
Peshawar	189,252	189,552.00
Quetta	225,059	225,059.00
	<u>4,571,000</u>	<u>4,571,000.00</u>

From the above it is clear that funds of Rs.54,095.54 were less utilized which were covered by excess utilization of funds by Karachi Centre. Expenses exceeding the budget of the Sub-centres were approved by the Executive Committee of Pakistan Science Foundation vide letter No.PSF/Accounts/1(17)87-88-PASTIC-1280, dated October 18, 1987.

As per cash book Rs.590,538.54 were remitted by Islamabad Centre to Sub-Centre Karachi as per cash of Karachi Centre Rs.565,901.17 were received. It was explained that the difference of Rs.24,637.37 was excess remittance to meet the medical expenses of Mr. Masood Ali Rs.23,371.77 and the salary of Mr. Siddiquddin Rs.1,265.60 on June 29, 1987 vide cheque No.00446/044537 and 00446/044539 respectively.

3. C.P.FUND:

(i). C.P.Fund was deposited for the month of August, 1986, Rs.33 but no deduction were made out of salary paid to Mr.Zia-ud-Din Farooqui and it was explained that deduction of Rs.33 will be made from the pay of August, 1990.

7. REPROGRAPHY EXPENSES:

7.1. Amount of Rs.7,000 and Rs.10,000 were paid to Mr. Zafar Ahmed on account of reprography expenses on January 11,1987 and November 23,1986 respectively. The supporting cash memo/bills dated January 26, 1987 was made available to us.

7.2. Expenses amounting to Rs.36,883 were incurred out of Reprography receipt with the approval of Chairman, PSF and Director General - PASTIC.

7.3. Rs.3,000 were paid to Mr. Farrukh Reza for the purchase of printing material on December 10, 1986 whose supporting bill/cash memo of the date December 12, 1986 was provided to us.

(v) SUB-CENTRE, PESHAWAR

1. C.P.FUND:

C.P.Fund of Rs.74 per month from salary of Mr. Mehboob-ur-Rehman from October, 1986 to June 3, 1987 while his appointment was on adhoc basis. Mr. Mahboob-ur-Rehman has been paid Rs.752 on October 10, 1985 of his C.P.Fund deduction made during the period mentioned.

2. DOCUMENTATION RECEIPTS:

Proper record of the documentation receipt was made available for our verification.

3. STOCK REGISTER:

Suzuki Van transferred to the Centre in the month of October, 1986 was entered in the stock register page 91 on October 2,1986.

Yours faithfully,

Sd/-

AKBAR AND COMPANY
CHARTERED ACCOUNTANTS

LAHORE: 65-SHAHRAH-E-QUAID-E-AZAM
DATED 4 Sept. 1990

AKBAR & COMPANY
CHARTERED ACCOUNTANTS

MUHAMMAD AKBAR
B.Com.(Hons.)F.C.A.

The Chairman,
Pakistan Science Foundation,
P-13, Al-Markaz, F-7/2,
Islamabad

Subject:- AUDIT OF BOOKS OF ACCOUNTS OF PAKISTAN
SCIENTIFIC AND TECHNOLOGICAL INFORMATION
CENTRE FOR THE YEAR ENDED JUNE 30, 1987.

Sir,

Reference to our meeting with Deputy Director, Finance and
Accounts, Pakistan Science Foundation from February 9, 1991
to February 11, 1991 regarding short comings/observations
pointed out in the previous report and we detail that the follow-
ing information/short comings in our report have been clarified
as under:-

1. ISLAMABAD CENTRE:

4. WELFARE FUND:

As per cash book Rs.500 was paid to Mr. Hakeem vide
Voucher No.17, dated September 3, 1985. Voucher
alongwith relevant supporting evidencve has been
provided for our verification.

6. REPAIR AND MAINTENANCE OF EQUIPMENT:

Rs.2,000 were paid to Mr. Zafar Ahmed on September 24,
1986 which has been recovered from the salary for
month of September 1990.

8. DOCUMENTATION RECEIPT:

Proper record of documentation receipt} was made
available for our verification.

ii. KARACHI CENTRE:

3. P.S.F. EXPENSES:

Expenses of Rs.992,880 were incurred by P.S.F. Employ-
ees at Karachi out of remittance of PSF. It has
been explained that those expenses are of PSF and
has been accounted for in PSF books of Accounts.

4. DOCUMENTATION RECEIPTS: Proper record of documentation receipts was made available for our verification.

Yours faithfully,
Sd/-Akbar & Company

LAHORE: SHAHRAH-E-QUAID-E-AZAM
DATE: FEBRUARY 11, 1991

**ILYAS SALEEM & CO.
CHARTERED ACCOUNTANTS
INTERNATIONALLY MIDSNELL**

ILYAS SALEEM & CO.
18-D, 6th Road,
Satellite Town,
Rawalpindi
Tele: 845318
Telex: 54028 SPK PK (Attn)
Cable: MIDSNELL Rawalpindi

AUDITOR'S REPORT

The Chairman,
Board of Trustees,
Pakistan Museum of Natural History,
Islamabad

re; PAKISTAN MUSEUM OF NATURAL HISTORY

Dear Sir,

Pleased to report that we have completed the audit of the books of accounts for the year ended June 30, 1987. We now enclose four copies of Receipt and Payments Account of Pakistan Museum of Natural History together with our report thereon, duly initialled by us for identification purposes. We shall be pleased to sign our report after these accounts have been considered and approved by the Board of Trustees and signed by at least two members of the Board authorised in this behalf.

Yours truly yours,

Sd/-

M O H A M M A D SALEEM

Rawalpindi September 21, 1988

OTHER OFFICES: KARACHI, LAHORE

A member of MIDSNELL an Internationally Association of Independent Accounting Firms

ILYAS SALEEM & CO.
Chartered Accountants

AUDITOR'S REPORT

We have examined the annexed Receipts and Payments Account of Pakistan Museum of Natural History for the year ended June 30, 1987 and we report that:-

- a) We have obtained all the information and explanation which we required.
- b) In our opinion and to the best of our information and according to the explanations given to us the Receipts and Payments Account which is in agreement with the books of Accounts, give a true and a correct view of the state of the Museum's affairs as at June 30, 1987.

Sd/-

ILYAS SALEEM & CO.
(Chartered Accountants)

Rawalpindi Sept. 21, 1988

ILYAS SALEEM & CO.
Chartered Accountants
Internationally Midsnell

Partners:
MOHAMMAD ILYAS
M.A., M.Com., LL.B. FCA

MOHAMMAD SALEEM
B.Sc., FCA

SAGHIR AHMAD
B.Com., ACA

The Chairman,
Board of Trustees,
Pakistan Museum of Natural History,
Islamabad

re: AUDIT REPORT OF ACCOUNTS JUNE 30, 1987.

Dear Sir,

Our comments emanating from audit are as under:-

1. An amount of Rs.2,850,000/- was advanced to CDA for the construction of Museum Building. We are unable to satisfy ourselves regarding the terms and conditions of this advance, however, reportedly there exists no agreement for the same.
2. Quotations were not regularly obtained for purchases.
3. Physical verification of fixed assets was not carried out.
4. No detail inventory of Stores and Stocks was provided to us.
5. Fixed Assets register and Expenses ledger were not properly maintained.
6. Cash in hand was not physically verified by us on the terminal date.

Sd/-

Very truly yours
MOHAMMAD SALEEM

ILYAS SALEEM & CO.
Chartered Accountants

PAKISTAN MUSEUM OF NATURAL HISTORY, ISLAMABAD

**RECEIPTS AND PAYMENTS ACCOUNT (RECURRING ACCOUNT)
FOR THE YEAR ENDED JUNE 30, 1987**

<u>RECEIPTS</u>	<u>1987 (Rs.)</u>
Opening = Cash in hand	13,500.60
Cash at Bank	<u>19,046.00</u>
	32,546.60
Grants	4,602,000.00
Pakistan Science Foundation	27,000.00
Insurance Claim	7,813.00
Miscellaneous Receipts	<u>7,276.35</u>
	4,676,635.95
	=====
<u>PAYMENTS</u>	
Salaries & Allowances	2,498,083.67
Rent Office Buildings	560,176.00
Rent residential buildings	399,363.00
Entertainment	17,309.36
Newspapers and Magazines	5,907.00
Telephone	127,450.83
Electric Gas & Water charges	120,237.00
Advertisement & Publicity	10,905.28
Postage and Telegramme	3,347.10
Medical charges	211,646.24
Audit fee	4,000.00
T.A./D.A.	98,858.40
Printing/Stationery/Consumable Stores	194,085.35
POL/Repair & Maintenance of Vehicles	127,828.43
Repair & Maintenance of Office equipment	6,214.00
Overtime	8,755.50

C.P.Fund contribution	188,235.00
Bank charges	20.00
Office Equipment	24,578.00
Furniture & fixture	24,238.78
G.L.I. Contribution	6,191.22
Gratuity	1,069.00
Deputation Pay	2,520.00
Ground Rent (C.D.A.)	1,750.00
Field Work Expenses	8,611.19
C.P.F Final Payment	1,308.53
Misc. Expenditure	9,514.00

4,662,202.88

CLOSING BALANCE

Cash in hand	8,026.75
Cash at Bank	<u>6,406.32</u>

14,433.07

4,676,635.95

Rawalpindi Sept. 20,1988

Sd/-

ILYAS SALEEM & CO.
Chartered Accountants

ILYAS SALEEM & CO.
Chartered Accountants

PAKISTAN MUSEUM OF NATURAL HISTORY, ISLAMABAD

**RECEIPTS AND PAYMENTS ACCOUNTS OF (DEVELOPMENT
PROJECT) FOR THE YEAR ENDED JUNE 30,,1987**

<u>RECEIPTS</u>	<u>1987 (Rs.)</u>
Development Grant	4,000,000.00
Foreign Exchange Grant (For Import of Scientific Equipment)	<u>1,275,000.00</u>
	<u>5,275,000.00</u>
	=====
<u>PAYMENTS</u>	
Purchase of Vehicles	398,000.00
Laboratory Equipment	277,876.00
Books and Journals	119,874.60
Advance to CDA for Construction of Building	2,850,000.00
Advance to PEPAC	162,891.00
Salaries	50,925.20
POL	23,100.00
Insurance Vehicles	6,654.00
Renewal Fee of Vehicle	11,045.80
Display Centre	99,473.00
Bank Charges	160.40
Expenses Against Foreign Exchange Grant	
Import Licence Fee	49,936.00
L.C. Margin	<u>1,225,064.00</u>
	<u>5,275,000.00</u>

Sd/-

Rawalpindi Sept. 21, 1988 ILYAS SALEEM & CO.
MIDSNELL Chartered Accountants

ILYAS SALEEM & CO.
Chartered Accountants
Partners:
MOHAMMAD ILYAS
M.A., M.Com., LL.B., FCA
MOHAMMAD SALEEM
B.Sc., FCA
SAGHIR AHMAD
B.Com., ACA

18-D, 6th Road,
Satellite Town
Rawalpindi
Tele: 845318
Telex: 54028 SPK
PK (Attn)
Cable: MIDSNELL
Rawalpindi

December 20, 1988

The Accounts Officer,
Pakistan Museum of Natural History,
ISLAMABAD

Subject:- AUDIT REPORT IN RESPECT OF PAKISTAN
MUSEUM OF NATURAL HISTORY FOR THE YEAR
1986-87

Dear Sir,

Please refer to your letter No.PMNH/ACCTS/AUDIT/
1(3)/86-87, dated 19.12.1988, regarding checking of compliance
of the audit observation as per audit report for the year 1986-87.
In this connection our representative visited to Pakistan Museum
of Natural History on 19.12.1988.

Audit observations as serial No. 2,5 and 6 given in the
audit report have been settled. Where as for the remaining obser-
vations, no satisfactory explanation was given, hence they stand
unsettled.

Very truly yours,

Sd/-

FOR ILYAS SALEEM & CO.
Chartered Accountants

**ILYAS SALEEM & CO.
CHARTERED ACCOUNTANTS
INTERNATIONALLY MIDSNELL**

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Satellite Town,
P.O.Box No.1731
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(Attn)
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Partners:

MOHAMMAD ILYAS
M.A. M.COM.,LL.B.,F.C.A.
MOHAMMAD SALEEM
B.Sc., FCA
SAGHIR AHMAD
B.Com., FCA

Ref: PMNH/Audt.Obs/280/90

August 27, 1990

The Director General,
Pakistan Museum of Natural History,
ISLAMABAD.

RE: AUDIT REPORT OF PAKISTAN MUSEUM OF NATURAL HISTORY
FOR THE YEAR 1986-87

Dear Sir,

In continuation of our letter of December 20, 1988.

Your representative Mr Ishaq Beg visited this office today the 27th August 1990 and produced the documents relating observations 1,3 & 4 raised in our letter of 21st September 1988. After thorough verification and discussion the undersigned is satisfied and the aforesaid audit observations are hereby settled.

Thanking you,

Yours faithfully,

Sd/-

(Shafiq-ul-Rehman)

OTHER OFFICES: KARACHI-LAHORE
A Member of MIDSNELL an International Association of Independent
Accounting Firms

PAKISTAN SCIENCE FOUNDATION ACT 1973

National Assembly of Pakistan

Islamabad, the 2nd February, 1973

The following Acts of the National Assembly received the assent of the President on the 31st January, 1973 and hereby published for general information:

Act. No. III of 1973

An Act to provide for the establishment of the Pakistan Science Foundation.

Whereas it is expedient to provide for the establishment of the Pakistan Science Foundation and for matters ancillary thereto,

It is hereby enacted as follows:-

1. SHORT TITLE, EXTENT AND COMMENCEMENT -(1) This Act may be called the Pakistan Science Foundation Act, 1973.

(2) It extends to the whole of Pakistan.

(3) It shall come into force at once.

2. DEFINITIONS -In this Act, unless there is anything repugnant in the subject or context.

(a) 'Board' means the Board of Trustees of the Foundation;

(b) "Chairman" means the Chairman of the Foundation;
and

(c) "Foundation" means the Pakistan Science Foundation established under this Act.

3. ESTABLISHMENT OF THE FOUNDATION:- (1) As soon as may be after the commencement of this Act, the Federal Government may, by notification in the official Gazette, establish a Pakistan Science Foundation to promote and finance scientific activities having a bearing on the socio-economic needs of the country.

(2) The Foundation shall be a body corporate by the name of the Pakistan Science Foundation, having perpetual succession and a common seal, with power, subject to the provision of this Act, to acquire, hold and dispose of property, both movable

and immovable, and shall be the said name use and be used.

- (3) The Head Office of the Foundation shall be at Islamabad.

4. FUNCTIONS OF THE FOUNDATION:- (1) The Foundation shall function as a financing agency for:-

- (i) the establishment of comprehensive scientific and technological information and dissemination centres;
 - (ii) the promotion of basic and fundamental research in the universities and other institutions on scientific problems relevant to the socio-economic development of the country;
 - (iii) the utilization of the results of scientific and technological research including pilot plant studies to prove the technical and economic feasibility of process found to be promising on laboratory scale;
 - (iv) the establishment of science centres, clubs, museums, herbaria and planetaria;
 - (v) the promotion of scientific societies, associations and academies engaged in spreading the cause of scientific knowledge in general or in the pursuit of specific scientific discipline of technology in particular;
 - (vi) the organization of periodical science conferences, symposia and seminars;
 - (vii) the exchange of visit of scientists and technologists with other countries;
 - (viii) the grant of awards, prizes and fellowships to individuals engaged in developing processes, products and inventions of consequence to the economy of the country; and
 - (ix) special scientific surveys not undertaken by any other organization and collection of scientific statistics related to the scientific effort of the country.
- (2) The Foundation shall also:-

- (i) review the progress of scientific research sponsored by it and evaluate the results of such research;
- (ii) maintain a National Register of highly qualified and talented scientists of Pakistan, including engineers and doctors, in or outside the country and to assist them, in collaboration with the concerned agencies in finding appropriate employment; and
- (iii) establish liaison with similar bodies in other countries.

(3) In the performance of its functions, the Foundation shall be guided on questions of policy by the instructions, if any, given to it by the Federal Government which shall be the sole judge as to whether a question is a question of policy.

5. BOARD OF TRUSTEES: (1) The general direction, conduct and management of the affairs of the Foundation, including administration of its funds, shall vest in a Board of Trustees consisting of the following numbers namely:-

Whole-time members

- (i) the Chairman
- (ii) one eminent scientist;
- (iii) the Director Finance;

to be appointed by the President

Part time members

- (iv) the Chairman of the National Science Council;
- (v) four scientists to be nominated by the National Science Council; and
- (vi) eleven eminent scientists to be nominated by the President.

(2) The remuneration and other terms and conditions of service of the Chairman and the two other whole-time members of the Board shall be such as may be determined by the President.

6. CHAIRMAN OF THE BOARD:- The Chairman of the Board shall be the Chairman of the Foundation and shall be appointed for a term of three years from amongst the eminent scientists of the country having experience of research and scientific administration.

7. **TERMS OF MEMBERS OF THE BOARD:-** The members of the Board, other than the ex-officio member, shall hold office for a term of three years and shall be eligible for re-appointment or re-nomination, as the case may be.
8. **MEETING OF THE BOARD:-** (1) The meeting of the Board shall be held at least twice a year and shall be presided over the Chairman or, in his absence, by its whole-time scientist member. (2) All decisions at a meeting of the Board shall be taken by a majority of the votes of the members present and voting.
9. **QUORUM AT THE MEETING OF THE BOARD:-** To constitute a quorum at a meeting of the Board not less than nine members shall be present.
10. **EXECUTIVE COMMITTEE:-** There shall be an Executive Committee consisting of the Chairman and the two whole-time members of the Board.
11. **DELEGATION OF POWERS:-** The Board may, from time to time, delegate the Chairman or the Executive Committee such of its power and functions as it may consider necessary.
12. **ADHOC COMMITTEE:** The Foundation may set up ad-hoc committee consisting of university professors and other leading scientists and experts to scrutinize applications for financial assistance for carrying out scientific research submitted to the Foundation by the universities or other institutions or by individual scientific workers or groups of scientific workers and to review and evaluate the results of research sponsored by the Foundation.
13. **FUNDS:-** The funds of the Foundation shall consist of:-
- (a) grants made by the Federal Government and the Provincial Governemnts;
 - (b) donation and edowments; and
 - (c) income from other sources.
14. **BUDGET:-** The Foundation shall cause to be prepared and approve a statement of its receipts and expenditure for each financial year.
15. **ACCOUNTS AND AUDIT:-** (1) The funds of the Foundation shall be kept in a personal ledger account of the Foundation with the State Bank of Pakistan or with any Branch of the National Bank of Pakistan acting as an agent of the State Bank.

(2) The accounts of the Foundation shall be maintained in such form and manner as the Auditor General of Pakistan may determine the consultation with the Federal Government.

(3) The accounts of the Foundation shall be audited by one or more auditors who are chartered accountants with in the meaning of the Chartered Accountants Ordinance, 1961 (X of 1961), and are appointed by the Foundation in consultation with the Auditor General of Pakistan.

16. APPOINTMENT OF OFFICERS AND SERVANTS:- (1) The Foundation may appoint such officers and servants and engage such consultants or experts as it may consider necessary for the efficient performance of its functions, on such terms and conditions as it may deem fit.

(2) In fixing the terms and conditions of service of its officers and servants, the Foundation shall, as nearly as may be conform to the scales of pay, allowances and conditions of service applicable to the corresponding class of employees of the Federal Government.

17. ANNUAL REPORT:- (1) The annual report of the Foundation which shall, among other things, clearly bring out the benefits accruing to the nation as a result of the activities sponsored by the Foundation, shall be prepared by the Chairman and submitted, through the Board to the Federal Government alongwith the audited accounts of the Foundation.

(2) The annual report alongwith the audited accounts of the Foundation shall be laid before the National Assembly.

18. REGULATIONS:- The Foundation may make regulations for the efficient conduct of its affairs.

19. REPEAL:- The Pakistan Science Foundation Ordinance, 1972 (LII of 1972), is hereby repealed.

LIST OF SANCTIONED PROJECTS DURING THE YEAR 1986-87

<u>S.No.</u>	<u>Project Title</u>	<u>Amount sanctioned</u>	<u>Name of P.I. & Organization supported.</u>
I. <u>AGRICULTURAL SCIENCES:</u>			
1.	Development of commercial cotton hybrid. S-PCCC/Agr (77/1)	Rs.47,528/-	Mr.Mohiuddin Ahmad, Cotton Research Institute, Sakrand, District Nawabshah Sind.
2.	Evaluation of adopted reclamation practices in Pindi Bhattian. P-UET/Agr (89)	Rs.72,457/-	Dr. M.I. Lone, Centre of Excellence in Water Resources Engineering U.E.T. Lahore.
II. <u>BIOLOGICAL SCIENCES:</u>			
1.	Chemotaxonomic studies in angiosperm from Pakistan with reference to phenolics. S-KU/Bio (116/1)	Rs.1,10,900/-	Dr.Khadija Aziz, Department of Botany, University of Karachi, Karachi.
2.	Study of genetic potential of local breeds of sheep/goat of Quetta. B-BU/Bio (143)	Rs.37,750/-	Mr. Afsar Mian, Department of Zoology, University of Baluchistan, Quetta.
3.	Clonal propagation of <u>Cari- ca papaya</u> and extraction of papain from it. S-KU/Bio (151)	Rs.4,43,840/-	Dr.Khalida Khatoon, Department of Botany University of Karachi, Karachi.
4.	Studies on the stability of hybrid plasmids carrying segments of <u>Bacillus subtilis</u> in <u>E.coli</u> P-PU/Bio (153)	Rs.4,61,700/-	Dr. Shahida Hasnain, Depratment of Botany, University of the Punjab, Lahore.
5.	Taxonomy and biology of the Entomostraca of Northern Punjab. P-GC/Bio (156)	Rs.4,11,400/-	Dr. Muhammad Saleem, Department of Zoology, Government College, Lahore.

III. CHEMICAL SCIENCES:

1. Synthesis and development of hydrogels for sustained release of drugs.
C-QU/Chem (159) Rs.2,74,900/-Dr. Muhammad Zulfiqar,
Department of Chemistry,
Quaid-i-Azam University,
Islamabad.
2. Chemistry and bio-chemistry of glycoprotein sulfotransferases as sulfate acceptors.
B-BU/Chem (162) Rs.6,63,200/-Dr. S. Altaf Hussain,
Institute of Bio-chemistry,
University of Baluchistan,
Quetta.
3. Amino acid sequence study on Haemoglobin and venoms from snakes found in Pakistan
S-KU/Chem (163) Rs.3,47,200/-Dr. Zafar H. Zaidi,
H.E.J. Research Institute of Chemistry
University of Karachi,
Karachi.
4. Biosynthesis of antibiotic bacitracin by bacillus licheniformis as supplement in poultry feed.
P-CSIR/Chem (171) Rs.2,42,850/-Dr. M.A. Qadeer,
Food Technology & Fermentation Division
PCSIR Laboratories,
Lahore.
5. Application of high performance liquid chromatography for multielemental analysis at trace levels using ketoamine schiff bases.
S-SU/Chem (172) Rs.3,86,900/-Dr. M.Y. Khuhawar,
Institute of Chemistry,
University of Sind,
Jamshoro.
6. Preservation of food by edible plant extracts,
S-KU/Chem (173) Rs.3,85,900/-Dr. Rashida Ali,
Department of Applied Chemistry,
University of Karachi
Karachi.
7. Physico-chemical studies on the structure of pure liquids and solutions and correlation with contraction and temperature changes thereof.
S-CSIR/Chem (174) Rs.2,59,000/-Prof. Gul Hassan Kazi,
N.C.E. in Analytical Chemistry,
University of Sind,
Jamshoro.
8. Estimation of heavy trace metals in various local fish species and relevant marine/fresh waters.
C-QU/Chem (175) Rs.1,58,400/-Dr. M. Jaffar,
Department of Chemistry,
Quaid-i-Azam University,
Islamabad.

9. Studies on the chemical constituents of some Labiatae plants of Pakistan
C-QU/Chem (177) Rs.2,38,500/-Dr.Mrs. Mashooda Hassan, Department of Chemistry, Quaid-i-Azam University, Islamabad.
10. Immobilization of enzymes and their applications in "flow injection analysis" for the determination of substrates of diagnostic importance.
B-BU/Chem (178) Rs.3,83,500/-Dr.MuhammadMasoom, Institute of Chemistry, University of Baluchistan, Quetta.

IV. EARTH SCIENCES

1. The interpretation and economic impact of the Palaeo-environments during the precambrian time in Salt Range and Potwar Plateau.
C-PMNH/Earth (30) Rs.1,58,400/-Dr.S.R.H. Baqri, Pakistan Museum of Natural History, Islamabad.
2. Stratigraphic analysis of Mesozoic and Paleogene rocks of Hazara, Azad Kashmir and Adjacent areas of Rawalpindi Distt. and Islamabad and variations in Kohat Potwar Provinces of Indus Basin.
S-SU/Earth (32) Rs.400,900/-Dr. M. A. Latif, Institute of Geology, University of Punjab, New Campus, Lahore.
3. Petrology and geochemistry of Punjal Volcancis in Poonch, Muzaffarabad and Kaghan valley,
AJK/Earth (33) Rs.4,08,200/-Prof. Dr. M. Ashraf, Institute of Geology, University of Azad Jammu & Kashmir, Muzaffarabad.
4. Petrotectonic elements and tectonic framework of North West Himalaya.
S-SU/Earth (37) Rs.4,43,000/-Dr. Nawaz Choudhry, Institute of Geology, University of Punjab, New Campus, Lahore.

V. ENGINEERING SCIENCES:

1. Conservation of electricity in the field of air-conditioning.
F-PU/Eng (24) Rs.2,09,300/-Prof. Iqbal Hussain, Department of Mechanical Engineering, NWFP University of Engineereing and Technology, Peshawar

VI. MEDICAL SCIENCES

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| 1. Sodium transport in erythrocytes of patients with treated & untreated essential hypertension.
P-PGMI/Med (109) | Rs.69,200/- | Dr. Shahnaz Javed Khan, Postgraduate Medical Institute, Lahore. |
| 2. Aquired immune deficiency syndrome (AIDS) seroepidemiology & surveillance.
S-JPMC/Med (114) | Rs.60,000/- | Prof. Amtual Hafiz, Jinnah Postgraduate Medical Centre, Karachi. |

ANNEXURE-III

INSTITUTIONAL SUPPORT

<u>S.No.</u>	<u>Institution</u>	<u>Amount sanctioned</u>
1.	Pakistan Museum of Natural History, Islamabad.	Rs.27,000/-
2.	Agriculture University, Faisalabad.	Rs.27,023/-
3.	National Nematological Research Centre, Karachi.	Rs.39,600
	Total	<u>Rs.93,623/-</u>

ANNEXURE IV

**PSF GRANTS SANCTIONED TO SCIENTIFIC SOCIETIES
AND LEARNED BODIES FOR THEIR APPROVED OBJECTIVES
FOR THE YEAR 1986-87**

<u>S.No.</u>	<u>Name of Society</u>	<u>Amount</u>
1.	Pakistan Academy of Sciences	Rs.50,000/-
2.	Pakistan Association of Scientists & Scientific Professions.	Rs.60,000/-
3.	Scientific Society of Pakistan	Rs.50,000/-
4.	Pakistan Association for the Advancement of Science.	Rs.50,000/-
5.	Society for the Advancement of Agri- cultural Sciences, Pakistan.	Rs.10,000/-
6.	Pakistan Medical Association Karachi.	Rs.20,000/-
7.	Biological Society of Pakistan	Rs.10,000/-
8.	Pakistan Society of Bio-chemists	Rs.10,000/-
9.	The Institution of Electrical Engineers of Pakistan.	Rs.50,000/-
10.	Pakistan Engineering Congress	Rs.30,000/-
11.	Pakistan Institute of Metallurgical Engineers.	Rs.15,000/-
12.	Pakistan Society of Nematologists.	Rs.10,000/-
13.	UNESCO National Committee on Man & the Biosphere Programme.	Rs.20,000/-
14.	Chemical Society of Pakistan	Rs.20,000/-
15.	The Institution of Engineers of Pakistan	Rs.50,000/-
16.	Pakistan Institute of Chemical Engineers	Rs.25,000/-
		----- Rs.4,80,000/- =====

ANNEXURE-V

GRANTS SANCTIONED TO VARIOUS SCIENTIFIC SOCIETIES/
LEARNED BODIES/ORGANIZATIONS FOR THEIR PUBLICATION
PROGRAMME

S.No.	Agency	Publication	Grant in Rs.
1.	Pakistan Academy of Sciences	Monographs	Rs.50,000/-
2.	Scientific Society of Pakistan	i) Jadid Science ii) Science Bachoun Kay Leeye"	Rs.50,000/-
3.	Pakistan Association for the Advancement of Science.	i) Pakistan Journal of Science. ii) Pakistan Journal of Scientific Research	Rs.1,00,000/-
4.	Society for the Advancement of Agricultural Sciences, Pakistan	Pakistan Journal of Agricultural Sciences	Rs.10,000/-
5.	Biological Society of Pakistan	Biologia	Rs.20,000/-
6.	Pakistan Society of Bio-chemists.	Pakistan Journal of Biochemistry.	Rs.20,000/-
7.	Pakistan Society of Nematologists.	Pakistan Journal of Nematology	Rs.10,000/-
8.	Chemical Society of Pakistan	Journal of the Chemical Society of Pakistan.	Rs.30,000/-
9.	Faculty of Veterinary Sciences, University of Agriculture, Faisalabad.	Pakistan Veterinary Journal.	Rs.10,000/-
10.	Pakistan Institute of Chemical Engineers.	Journal of the Pakistan Institute of Chemical Engineers.	Rs.25,000/-
11.	Khyber Medical College, Peshawar.	Pakistan Oral & Dental Journal.	Rs.15,000/-
12.	Pakistan Forest Institute, Peshawar	Pakistan Journal of Forestry.	Rs.15,000/-

13. University of Karachi Karachi.	Journal of Pharmacy	Rs.20,000/-
14. Nuclear Research Laboratory, Government College, Lahore.	Journal of Natural Sciences & Mathema- tics.	Rs.10,000/-
15. Federal Govt. Urdu Science College, Karachi.	Tehqeeq	Rs.15,000/-
16. Pakistan Pharmacological Society, University of Karachi, Karachi.	Journal of Phar- macology.	Rs.10,000/-
		<u>Rs.4,10,000/-</u> =====

ANNEXURE-VI

LIST OF TRAVEL GRANTS SANCTIONED DURING 1986-87

S.No.	Name of Scientist	Conference/Symposium etc.	Amount
1.	Dr. Shahana Urooj Kazmi, University of Karachi, Karachi.	8th annual meeting of American Society of Micro- biology, U.S.A.	Rs.19,915/-
2.	Prof. Abdul Wahab Khan University of Engg. & Technology, Lahore.	Symposium on electric power generation in fast developing countries, Saudi Arabia.	Rs.10,005/-
3.	Dr. Abdul Haq, University of Baluchistan Quetta.	4th Miami internat- ional symposium, Florida, U.S.A.	Rs.28,080/-
4.	Dr. Riazul Haq Tariq, Bahauddin Zakaria Univ- ersity, Multan	Malysian chemical con- gress, Kuala Lumpur, Malaysia.	Rs.8,780/-
5.	Dr. Zafarullah Chaudhri Postgraduate Medical Institute, Lahore	1st Beijing Internat- ional conference in general surgery, Beijing, China.	Rs.24,366/-
6.	Dr. Mohammad Karim Chaudhry, Director of Agriculture, Azad Kashmir Mazaffarabad.	Meeting with agri- cultural scientists RNA, France	Rs.25,458/-
7.	Dr. Sher Akber, University of Baluchistan Quetta.	Post doctoral research at Linkoping Institute of Technology, Sweeden.	Rs.25,800/-
8.	Prof. S. Abid Hussain University of Engg. & Technology, Lahore.	International minal processing symposium, Izimir, Turkey.	Rs.19,540/-
9.	Dr. M. Afzal Beg, University of Punjab, Lahore.	To visit statistical services centre, University of Reading, U.K.	Rs.13,550/-
10.	Dr. Muhammad Alim Mian, Soil Survey of Pakistan, Lahore.	XIIIth congress of the international society of soil sciences, Hamberg, Germany	Rs.16,140/-

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| 11. Prof. S. Ishfaq Hussain
University of Sind,
Jamshoro. | 6th international con-
gress of parasitology,
Australia. | Rs.23,220/- |
| 12. Mrs. Faiz Alm Zaib,
Khyber Hospital,
Peshawar. | 3rd International Con-
gress of Psychiatric
Nursing, U.K. | Rs.13,110/- |
| 13. Dr. M.A. Hafeez,
Quaid-i-Azam University,
Islamabad. | International Symposium
on functional morphology
of Neuroendocrine,
W. Germany | Rs.21,710/- |
| 14. Dr. Asghar Qadir,
Quaid-i-Azam University,
Islamabad. | 11th International Con-
ference on general
relativity and gravitation,
Stockholm, Sweden. | Rs.34,310/- |
| 15. Prof. Faizullah Abbasi
Mehran University of
Engg. & Technology,
Jamshoro. | International seminar on
computer aided production
engineering, U.K. | Rs.11,874/- |
| 16. Dr. Arif Kazmi,
University of Karachi,
Karachi. | 192nd meeting of the
American chemical society,
New York, USA. | Rs.21,295/- |
| 17. Dr. M.A. Maqbool,
University of Karachi,
Karachi. | International congress
of Nematology, Florida,
U.S.A. | Rs.42,476/- |
| 18. Dr. Hafiz-ur-Rehman,
F.G. Urdu Science
College, Karachi | 2nd International congress
on the History of Turkish
Islamic Science &
Technology, Istambul
Turkey. | Rs.8,400/- |

Rs.3,67,849/-

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